

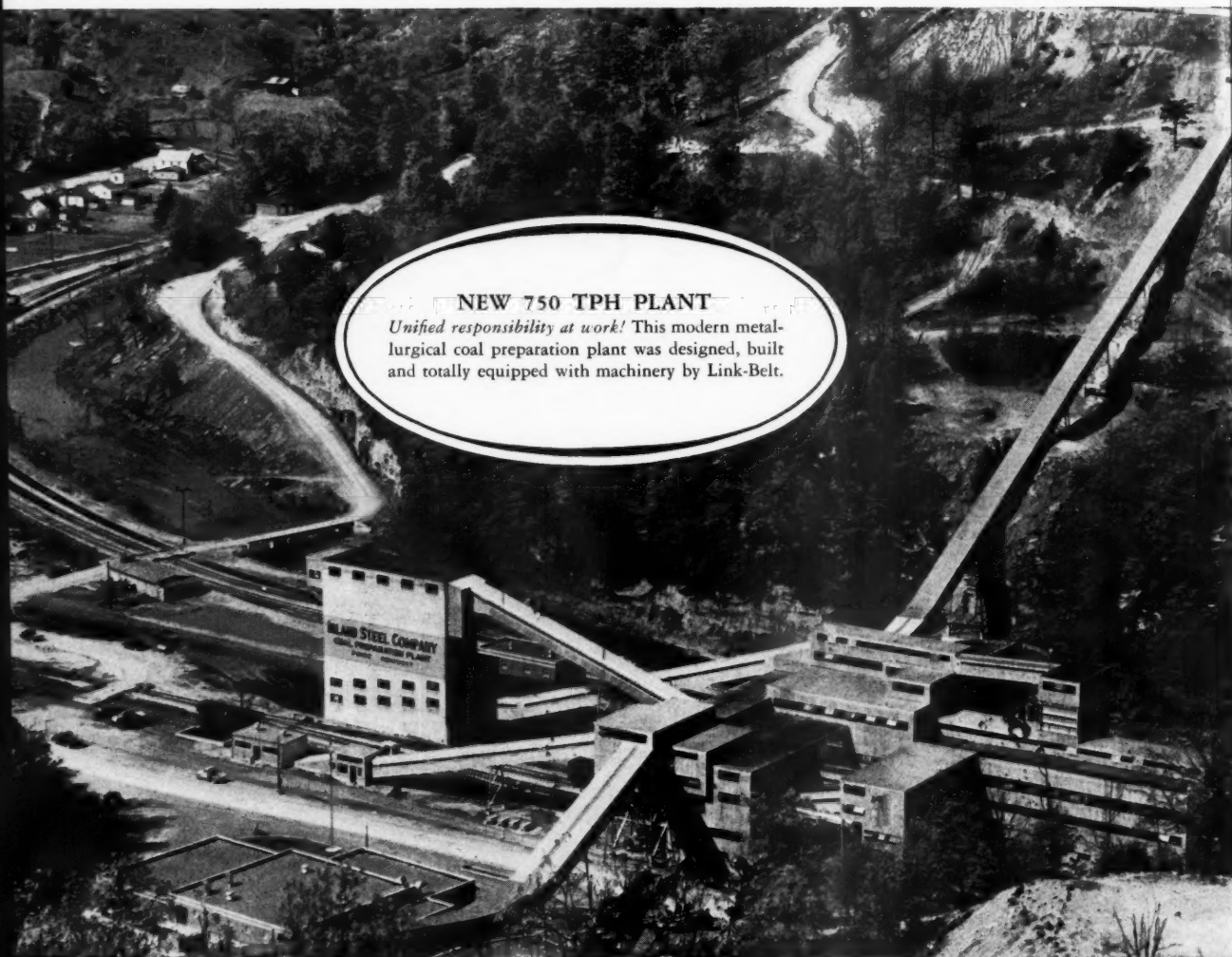
Mining

CONGRESS JOURNAL



JANUARY
1951





NEW 750 TPH PLANT

Unified responsibility at work! This modern metallurgical coal preparation plant was designed, built and totally equipped with machinery by Link-Belt.

New Inland Steel coal preparation plant designed and built by LINK-BELT

Another example of how LINK-BELT fulfills complete unified responsibility

When Inland Steel wanted a new plant at Price, Ky., for the efficient preparation of run-of-mine coal—they turned the job over to Link-Belt.

From the modern buildings that house the equipment—to the mine car dumping, coal cleaning, coal handling, and refuse disposal machinery—it was Link-Belt all the way. It's an example of how Link-Belt engineers—working with your engineers—can help solve your problems.



COAL PREPARATION and HANDLING EQUIPMENT

LINK-BELT COMPANY Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8, Johannesburg.

12,219



—and the First Year

—they saved \$24,000.00

with only 16 new

S-D 1-2-3

“Automatics”

No, the new cars alone didn't save all this money but the S-D “Automatic” system of haulage did. Think about it . . . fifteen hundred dollars saving per car per year . . . in a small tonnage mine by changing over to the S-D “Automatic” system of moving coal from the mine to screening plant with only sixteen cars. And this saving of \$24,000.00 was in man hours alone, based on 250 working days annually . . . an actual case on record.

The S-D “Automatic” system comprises any number of required cars (usually one-third to one-half the old cars) plus an adequate storage bin. This combination has proved beyond question its low cost per ton advantages. A storage bin of sufficient capacity is essential to constant coal production and low cost operation. First, it permits full time mine operation with only part time operation of screening plant. Second, it guarantees independent non-stop operation of either screening plant or mine in case of temporary shut-down of one or the other. Use of the bin is possible only with drop-bottom “Automatic” cars and no other type of haulage. This bin is, in fact, the control point between mine and

screening plant for a balanced operation. Incidentally, the bin supplies the continuous, even flow of coal so necessary to effective screening plant operation.

These sixteen cars were paid for out of the savings at this mine, in **SEVEN MONTHS**. Continued savings will pay for the storage bin cost shortly.

Many coal mine operators are waking up to the fact that the tremendous savings resulting from a change-over to the S-D 1-2-3 “Automatic” system of coal haulage is vital to maximum profits.

There are other operators, however, who are completely unaware of the fantastic losses they are taking simply because they haven't investigated the S-D “Automatic” system of moving coal.

Not every change-over, of course, offers the same opportunity for cutting costs, but in every case, large savings are obvious. In fact, the potential savings today are much greater because of inflated operating costs.

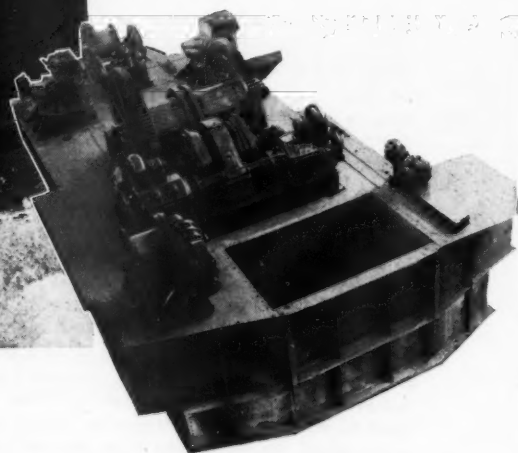
If you are using obsolete, worn out cars in your mines . . . and without a storage bin, let one of our engineers discuss improvements that will turn your losses into profits. Drop us a line today.

SANFORD-DAY IRON WORKS KNOXVILLE, TENNESSEE

Loads 30 tons a minute —electrically!

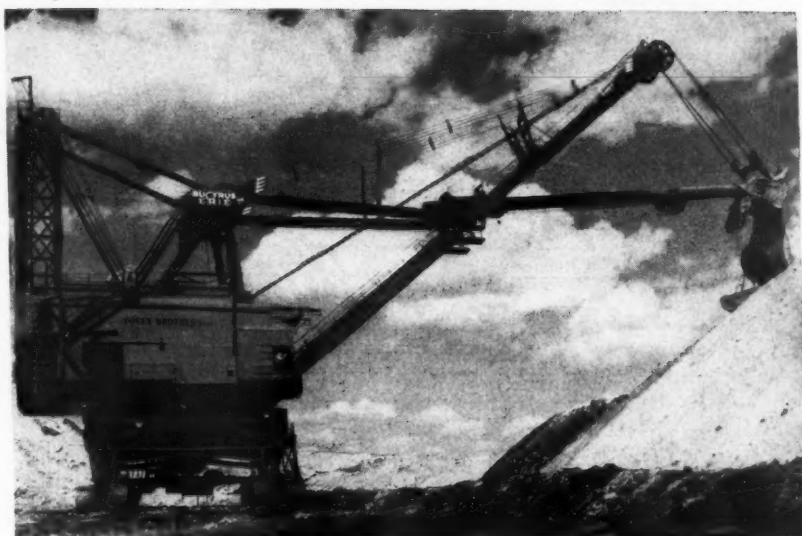


1 With a 17-yard dipper and an 85-foot boom length, this new loader needs only five passes, averaging 35 seconds each, to load a standard 75-ton coal car! Thanks to G-E amplidyne control of hoist, swing, and crowd motions, the operator gets instant-acting response from the huge shovel, plus fast acceleration and deceleration that cuts cycle time to a minimum. With main drive completely G-E equipped, this world's largest coal loader contains motors totalling some 2000 horsepower.




**AMPLIDYNE-CONTROLLED
SHOVEL DRIVES**
... to cut mining costs!

2 Muscle power for the loader—shown in this view of machinery deck during assembly—includes two 187½-hp hoist motors (foreground), two 75-hp vertical swing motors, and a 75-hp crowd motor (background). G-E MD series motors—the toughest G-E shovel motors ever built—permit handling heavier loads safely at higher maximum speeds, provide more hp per frame size, require less inspection and maintenance.

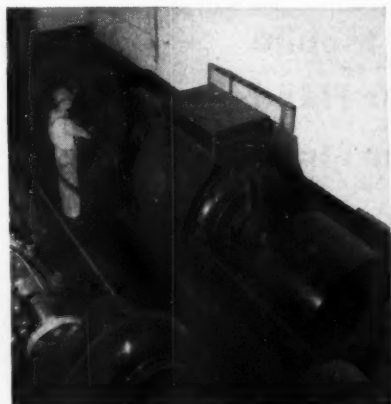


3 This mammoth strip shovel—the loader's teammate and also electrically equipped throughout by General Electric—can pick up a load of overburden with its 20-yard dipper and drop it 300 feet away! In addition to amplyne control of all motions, it utilizes a G-E amplyne power-factor regulator that substantially reduces voltage variation, permits more efficient operation of the equipment.



World's largest loading shovel—together with giant stripper—relies on G-E equipment to help maintain average output of 100 tons of coal per man per day at Foley Bros. Inc. operation near Colstrip, Montana!

4 Hoist, swing, and crowd motors in the stripper are precisely governed by its G-E amplyne control, shown mounted atop G-E motor-control cabinet inside the shovel house, with G-E switchgear at left. Small and compact, it uses fewer control devices, takes up minimum space, protects equipment against excessive current and torque peaks.



5 Incoming a-c power, protected against outages by neutral grounding, is converted to d-c by this 7-unit motor-generator set. Neutral grounding assures maximum protection for operating personnel and minimum equipment shut-downs in case of any line-to-ground fault. On large shovels of this type, designed to pay off by continuity of operation and high output, this is an especially important factor.



6 These two G-E 250-hp hoist motors, as well as the stripper's other motors, are of extra-tough construction for extra-heavy duty. They feature removable top portion for easy inspection and maintenance—right on the shovel—without disturbing motor alignment. Removal of external connections and four bolts provides easy access to armature and brush holders.

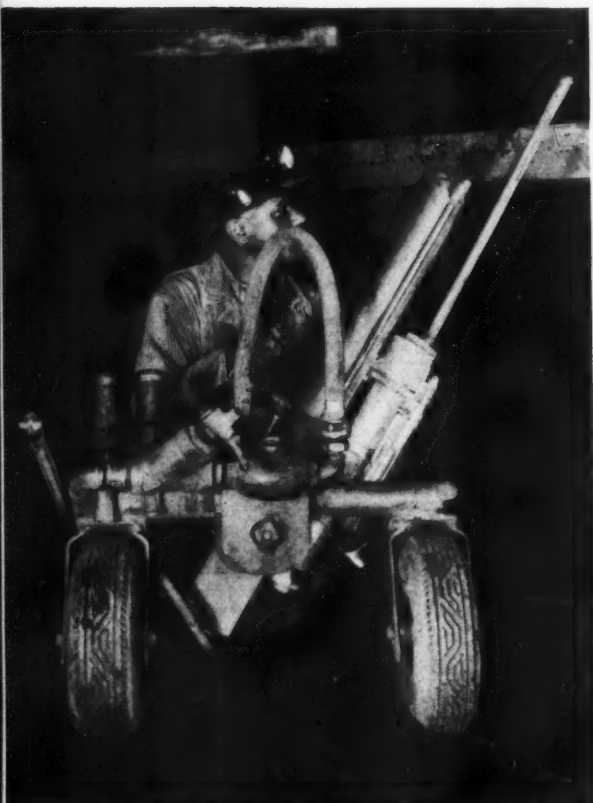


7 Like the stripper's hoist and crowd motors this G-E 125-hp vertical swing motor, one of two, is built for extra-tough jobs. Literally thousands of shovels and draglines have been electrified by G. E. to boost output, cut costs. This experience is at your service when you call in a G-E mining specialist, or specify G-E shovel equipment. Send for Bulletin GEA-4843, "More Yards Per Day." Apparatus Department, General Electric Company, Schenectady 5, New York.

GENERAL  ELECTRIC

663-11

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50% MORE HOLES
in less time and with
far less effort—with



JOY Roof-Bolting Drills and Mine-Air Compressors—available in a complete range of types and sizes to meet any requirement—are backed more than 50 years of drill and compressor-building experience.

the **NEW**
JOY

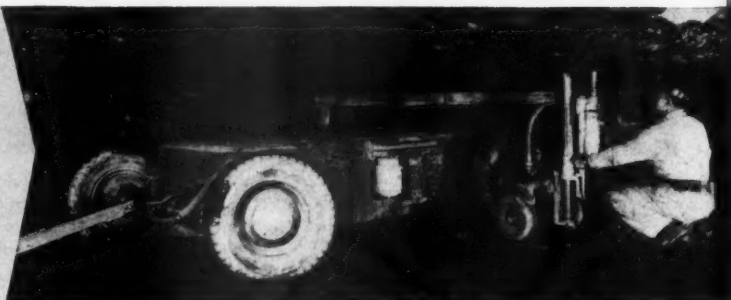
**RUBBER TIRE-MOUNTED
ROOF-BOLTING DRILL**

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- ★ Greater Flexibility
- ★ Greater Stability

The other half of your Roof-Bolting Team

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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THE AMERICAN MINING CONGRESS

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Published Monthly. Yearly subscriptions, United States, Canada, Central and South America, \$8.00. Foreign, \$5.00. Single copies, \$0.30. February Annual Review Issue, \$1.00. Entered as Second-class Matter, January 30, 1915, at the Post Office at Washington, D. C.



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For the toughest jobs . . . choose

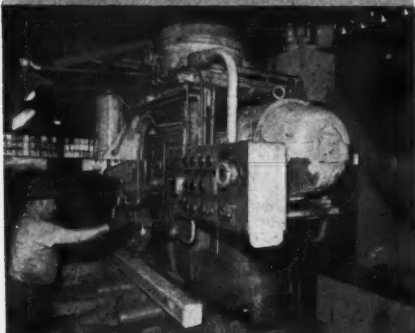
THE TOUGHEST MOTORS EVER BUILT!



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On continuous miners, specially designed Reliance Type 'T' D-c. Motors provide greater horsepower in the limited space available than ever before attained.



Power for chipper of Billtear is provided by motor which is subject to recurring shock overloads. Protection and capacity, without excess weight, are obtained by use of force-ventilated Reliance Type 'T' D-c. Motor.



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Wherever motors must meet rugged service requirements, Reliance Type 'T' Heavy Duty D-c. Motors are right in their element! Designed, engineered and constantly improved to satisfy the requirements specified by users, these dependable motors have proved their amazing endurance in steel mills, in underground mines and in countless other industrial applications.

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GOODMAN 10 TON METAL MINE LOCOMOTIVE

WITH TWO 60 HP MOTORS;
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Practical features of this rugged, heavy duty unit include: hydraulic brakes, roller bearing journals, camtactor control, transverse equalizers, sealed beam headlights. Can be built for 24" to 36" gauge or 30" convertible to 24".

Power for heavy hauls
Low enough to use
under the shutes
Narrow enough to pass
rotary or gravity dumps

Plus

full protection for electrical units and motors against water and muck — customary Goodman construction for metal mine service.

Goodman locomotives in trolley, storage battery and combination types cover the entire range of metal mine service. Let us help you select the Goodman locomotives which meet your particular mine conditions.

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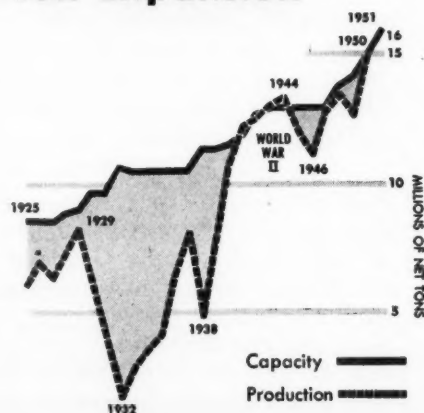
MILLION TONS MORE STEEL

**Latest Increase in Bethlehem's Annual Capacity Climaxes
5 Years of Postwar 3,100,000-Ton Expansion**

On January 1 of this year Bethlehem's steel making capacity stood at 16 million ingot-tons annually—an increase of 1 million tons over a year ago.

Since the war ended we have increased our annual steelmaking capacity 3,100,000 tons, or 24 per cent.

Moreover, as the chart at the right shows, Bethlehem's steel capacity has nearly doubled in 25 years. Additional capacity can and will be created as it is needed.



BETHLEHEM STEEL ★





SUPERLA

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Mine Lubricants

How to cut loading time and repair costs...

SUPERLA Mine Lubricants have reduced loader-clutch repair costs as much as 50% in midwest mines. They have eliminated delays for "warming up" loaders. They have made possible easier and faster loading. Here's why they will assure similar benefits for you:

Superla Mine Lubricants keep transmission cases clean. Clutches operate easily with no gumming or coking caused by oil deposits. When machines are started, these lubricants flow readily between clutch plates, *protect them against wear, eliminate "clutch drag" and the necessity for warming up loaders.* During long periods of continuous operation, Superla Mine

Lubricants do not thin out excessively, provide safer lubrication for clutch plates.

A test of Superla Mine Lubricants will prove their ability to keep your loaders on the job longer with less maintenance. These products are available in oil and grease grades suitable for any type of cutter or loader. A Standard Oil Lubrication Engineer will gladly help you select the proper grades for your equipment.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

SIX GRADES FOR LUBRICATING ANY TYPE OF CUTTER OR LOADER

No. 00. An oxidation-inhibited oil containing a detergent additive. It provides exceptionally clean operation and low oil consumption for oil-lubricated gear cases.

No. 0. A high-quality additive-type oil similar to No. 00 but of a slightly heavier grade. It is designed for Goodman loaders and cutters.

No. 2. A soft, semi-fluid grease for lubricating gathering-head gear cases where greater fluidity is desired than that usually provided by most loader greases.

No. 4. A semi-smooth grease particularly resistant to thinning out

under heat and mechanical working. At the same time it can easily be poured from the barrel bung at ordinary mine temperatures. It is especially designed for Joy loaders.

No. 6. A grease of heavy consistency and good high-temperature characteristics. Its fibrous structure makes it particularly useful on mine car wheels and for general underground lubrication.

No. 8. A smooth grease having superior high-temperature characteristics. It is suitable for armature bearings and pressure-gun work where a grease of heavy consistency is desired.

STANDARD OIL COMPANY (INDIANA)





Moving Mountains

**S-A Belt Conveyor Sets Tonnage Records
—Year After Year**

In eleven years this S-A heavy-duty belt conveyor has moved more than 91 million tons of copper ore over a distance of 1412 feet . . . and the conveyor is good for many more years of equally heavy duty service. Travelling at a speed of 600 feet per minute, 4818 tons of copper ore are handled per hour—a continuous, high-capacity operation that shows an exceptionally low cost per ton handled.

Soundly engineered, S-A Bulk Materials Handling Equipment is employed by leading producers of metallic ores the world over for all phases of handling. When you consider a new conveyor system, or an addition to your present equipment, look to the S-A staff's 50 years' experience and the complete S-A line to provide the right answer. *Write today —no obligation.*

LARGE SOUTH AMERICAN COPPER MINE

This conveyor—60" wide—is 1412 feet long from head to tailshaft. It is fed and discharged by loading bridge and movable tripper at any point along its quarter-of-a-mile length. Live shaft carrier rollers and heavy-duty, anti-friction bearings reduce friction and cut power requirements of conveyor to a minimum. This prolongs the useful life of the conveyor. S-A style "444" carriers are especially designed and constructed for long-distance, economical, dependable transportation of heavy materials in large volume.

50 years experience **STEPHENS-ADAMSON** MFG. CO. with bulk handling
1901-1951

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DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT.

HOW CAN A COUPLER

BE SO TOUGH?

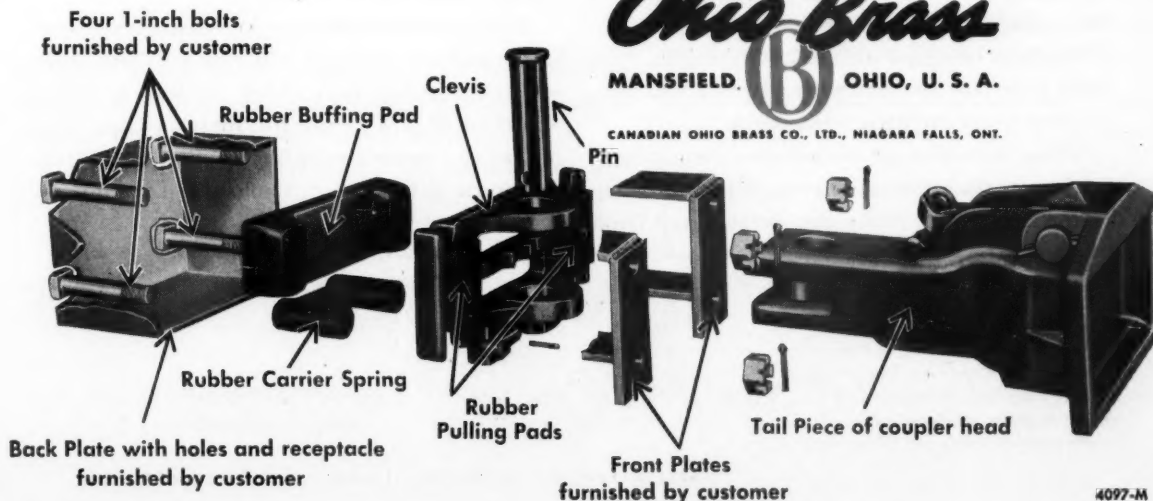


In hard haulage service, this O-B Automatic Coupler meets every requirement for strength and utility.

How do O-B Couplers stand up to the repeated whacks and jolts encountered in a mine car haulage system? To some, it must seem that any coupler has to give sooner or later, for the punishment is terrific. But O-B Coupler owners know that O-B Couplers won't knuckle down under any sort of rough treatment, and one of the reasons is because of the tough rubber draft gear.

The rubber buffing pad and the rubber pulling pads in the O-B Form-8 Coupler can absorb impacts of as much as 100,000 pounds. These pads, shown in the exploded coupler illustration, occupy less space than steel springs, are more resilient, and are not susceptible to the deteriorating effects that steal the strength of steel springs.

Tough, durable O-B Couplers will improve the operation and maintenance of your haulage system. Less time needed for car handling, safer handling, fewer repairs and longer car life are some of the advantages gained from O-B Automatic Coupling. An O-B engineer is ready to study your system and its needs. Let him help with your planning for improved haulage.

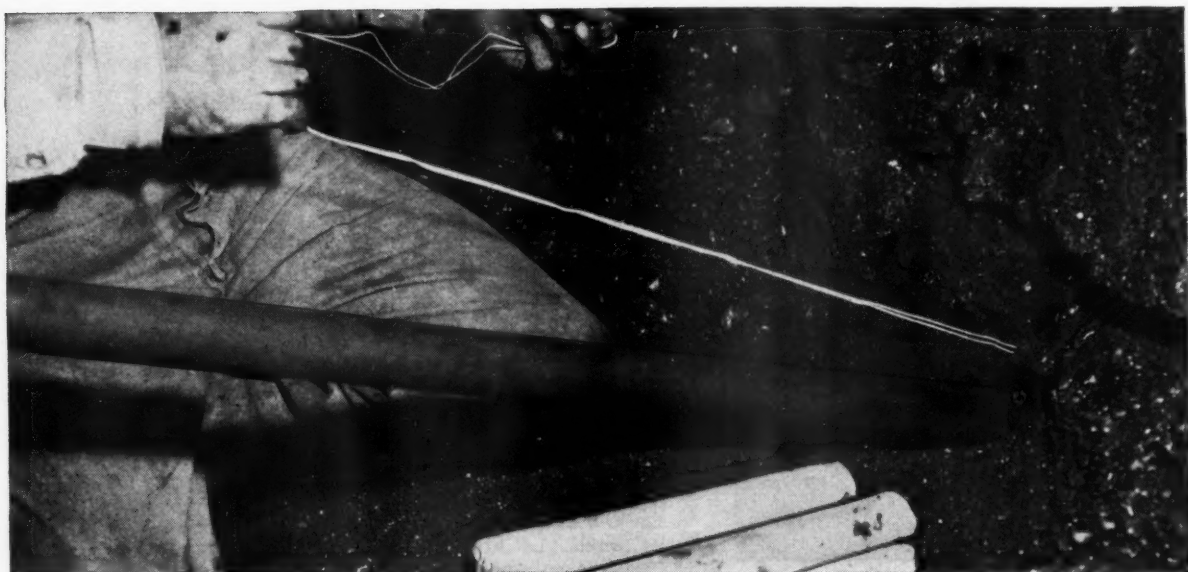


4097-M

The RIGHT caps for the job...



**Du Pont
Iron Wire
Electric
Blasting Caps!**



Cost less . . . better visibility in coal . . . easy to remove by magnetic separators

More and more coal mine operators with an eye on rising costs are switching to Du Pont Iron Wire Electric Blasting Caps.

Specially designed for use in coal mines, Iron Wire Caps cost less than most other electric caps, yet have many exclusive advantages.

White insulation on wires makes them easy to see in even the poorest light—an important safety factor. And Iron Wires can be removed from

broken coal by magnetic separators—another feature worth considering.

Think of these 3 points—low cost, greater visibility and easy removal—the next time you order electric blasting caps. Then be sure to select Du Pont Iron Wire Electric Blasting Caps. You can't buy a better iron wire cap! E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

●OF COURSE . . . you can be sure of top performance from all Du Pont Electric Blasting Caps, regardless of type. All have nylon-insulated leg wires, rubber plugs and shielded shunts to assure maximum safety and effectiveness.

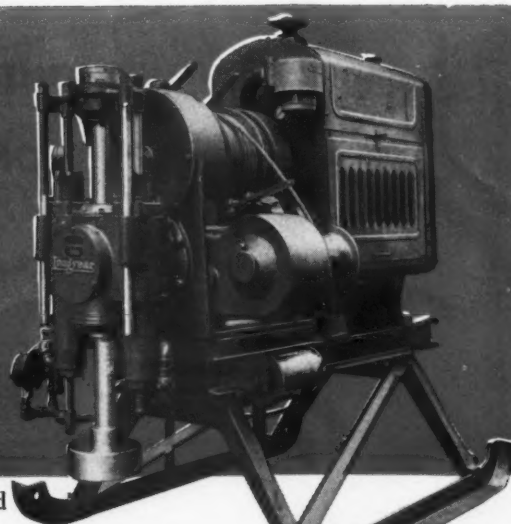
DU PONT EXPLOSIVES



*Blasting Supplies
and Accessories*

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

IT'S THE
***Built-in
Quality***
THAT COUNTS



That's why Longyear insists on selected materials, and precision machining in building diamond core drills. Here are examples of parts or processes that must meet critical tests: sound castings, high-grade alloys for gears and shafts, perfect alignment, precise tolerances, quality bearings, thorough lubrication. These features give Longyear drills endurance, steady performance, economical operation. Select any Longyear model and know that goodness goes all the way through.

ECONOMY RESULTS FROM BUILT-IN QUALITY

The Junior and UG Straitline core drills illustrated are popular models. They repeatedly demonstrate to users the value of sound internal construction. Operators are getting **STEADY DRILLING PERFORMANCE**, and **LARGER FOOTAGES** per shift because there are no break-downs due to inferior materials or workmanship. These factors add up to **OPERATING ECONOMY**. The word gets around. That is the reason for new orders, and why repeat orders keep coming in. Think it over and let us quote you on suitable drill equipment for your next job.

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Longyear manufactures a complete line of core drills—large or small, for surface or underground use. There is a quality-built model suited to your needs.

Also, quality-built diamond drill accessories and standard supplies are available from stock.

Write us for specific information.



Upper Picture—Junior Straitline, Diesel Driven
Capacity: 1000' of EX core or 800' of AX core

Lower Picture—UG Straitline, Air Driven
Capacity: 2000' of EX core or 1600' of AX core

Each model is equipped with screw feed or hydraulic drilling head; also may be supplied with air, electric, gasoline or Diesel motive power.

Remember, we do core drilling under contract. You may prefer to use this service rather than to buy drills. Consult us on your requirements.

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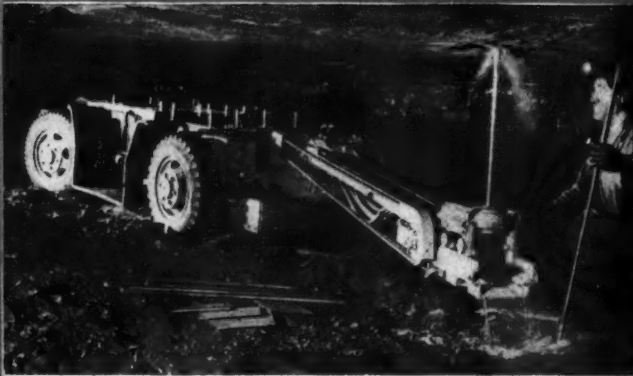
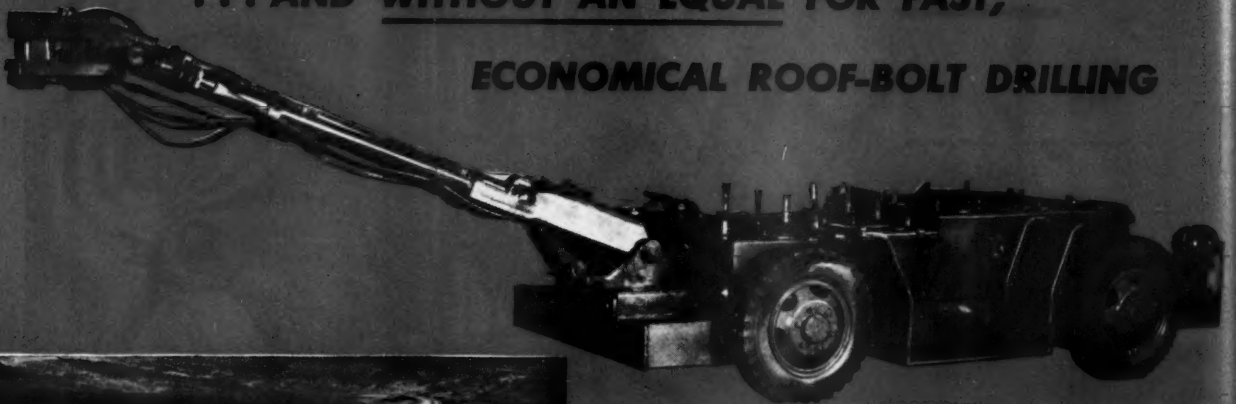
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SHAFT SINKING • GEOLOGICAL INVESTIGATIONS

REPRESENTATIVES IN PRINCIPAL MINING CENTERS IN THE UNITED STATES AND OTHER COUNTRIES

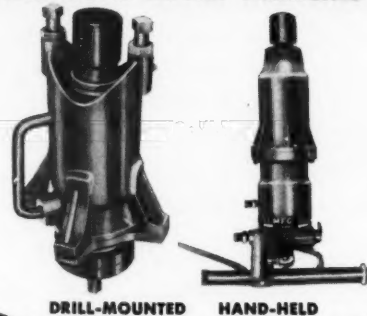
ONE-MAN OPERATED . . . SELF-PROPELLED

. . . AND WITHOUT AN EQUAL FOR FAST,

ECONOMICAL ROOF-BOLT DRILLING



HYDRAULIC IMPACT WRENCHES



The **JOY RBD-1 HYDRAULIC ROOF-BOLTING DRILL**

- ★ Built in 26", 30" and 36" heights. Wherever rotary drills are applicable, the RBD-1 consistently out-drills other types—either pneumatic or electric—producing as many as *two-thirds more holes per shift*.
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- ★ May be equipped for wet drilling—or with vacuum dust remover, as desired—to eliminate objectionable dust.
- ★ Hydraulic impact wrenches are available, either drill-mounted, feed-leg mounted, or hand-held types. All types derive their power from the machine—have ample torque to drive nuts to refusal.
- ★ SULMET Carbide Bits and Drill Steels designed for the RBD-1 Drill are available.

W & D CL 3412

Consult a Joy Engineer

JOY MANUFACTURING COMPANY

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This
Is
Really
One
For
The
Book!



FEW PEOPLE would expect a blasting cap plant to be one of the safest places to work. Yet Atlas workers, on December 6, 1950, completed five years of making Manasite blasting caps and electric blasting caps without a single lost-time injury! During this period, they produced well over 250,000,000 of these detonators.

The last injury serious enough to send an employe home from work, five years ago, was a wrenched back. The one before that, a bruised ankle. In fact, no lost-time injury has been caused by an explosion in the plant since Atlas converted to Manasite blasting caps and omitted fulminate of mercury as an ingredient in these products some twelve years ago.

Little did anyone realize, then, the new degree of safety which would be made possible in the plant, as well as in the quarries, mines and construction jobs where blasting caps are used. Thanks to pioneering by Atlas research, engineers and experienced production employes, the safety of making and using blasting caps has made a great forward stride. Manasite detonators give greater effectiveness to the safety precautions which must always be followed in handling explosives.

Manasite is typical of Atlas contributions to safer, more effective, and more economical blasting. That's why you can expect to get the *right* answers to blasting problems from Atlas—originator of Manasite detonators and the famous ROCKMASTER "16" Blasting System.

Rockmaster and Manasite: Reg. U. S. Pat. Off.

ATLAS

EXPLOSIVES

"Everything for Blasting"



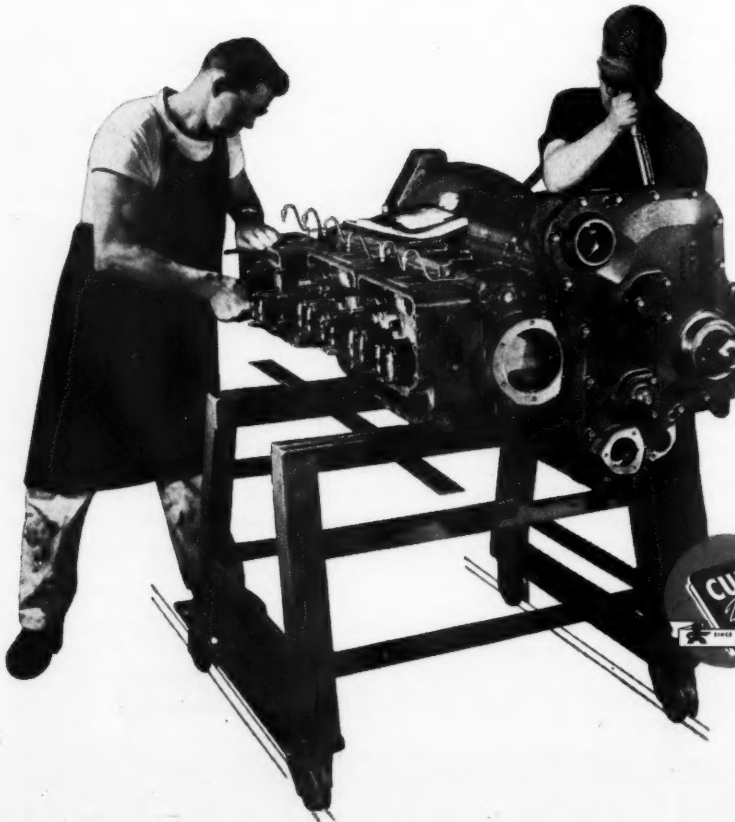
ATLAS POWDER COMPANY, Wilmington, Del. • Offices in principal cities • Cable Address—Atpowco

Cummins® Custom-built Diesels

*Built
not once
but
Twice*



**Extra care in building means
extra profits for power users**



Typical of the extra care that goes into the building of *every* rugged, dependable Diesel is the tear-down of the engine after assembly. First the engine is run in on the test block. Then it is completely torn down and carefully re-inspected. After that it is re-assembled and tested *again*.

Such *extra* care in precision craftsmanship is one of the reasons why Cummins engines have such an outstanding record in a wide range of applications. Cummins exclusive fuel system ... world-wide service and parts supply organization ... are other features that enable power users to make more profit with Cummins Diesels.

There's a model engineered to fit your power needs. Contact your Cummins dealer. He has more facts to show you.



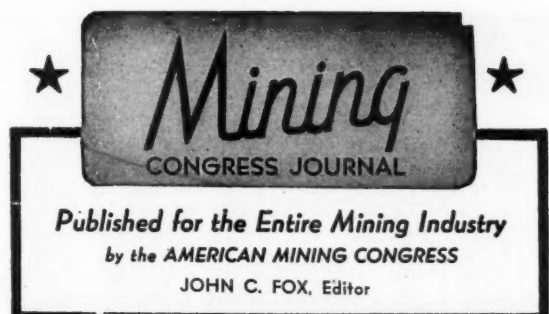
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**Diesel power by
CUMMINS**

CUMMINS ENGINE COMPANY, INC. • COLUMBUS, IND.

EXPORT: CUMMINS DIESEL EXPORT CORPORATION
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Lightweight High-speed Diesel Engines (50-550 hp) for:
On-highway trucks • off-highway trucks • buses • tractors • earth-
movers • shovels • cranes • industrial locomotives • air compressors
logging yarders and loaders • drilling rigs • centrifugal pumps
generator sets and power units • work boats and pleasure craft.



VOLUME 37

JANUARY, 1951

NUMBER 1

New Year's Resolutions

JANUARY 1 is an arbitrary boundary which divides one year from the next for the convenience of accountants and historians. For most of the rest of us last year's problems are not solved just because it is 1951 now, and no longer 1950. But the end of one calendar year and the beginning of another does present us with a sort of vantage point, to look backward over the past twelve months, to see how far we have progressed, and to look forward and plan what will be done to further our affairs in the twelve months to come.

The world situation presents a panorama composed of problems solved during the past year to look back on with pride, others partially solved for which answers must be found.

On the international level, we can see a Russia holding onto membership in the United Nations Organization with one hand and at the same time openly violating all the rules about which her representatives shout so loudly at Lake Success. Her pawns in Korea have shown that our armies are not as powerful as we thought. What then holds back the aggressor? It is our productive strength. Our capacity to produce is more of a deterrent to any aggressor than all our armies, atom bombs or H-Bombs. A country able to out-produce its enemies and to continue to out-produce them, in the long run will come out on top. Today our potential for production is tremendous and holds back open Communist aggression. We must preserve this potential at all costs in spite of high taxes, large military expenditures and civilian controls. Apparently our task is not going to be one of out-producing the enemy for a few years as it was in the early forties. This time we must be prepared to provide for all-out defense mobilization needs together with essential civilian demands for a period of ten, perhaps more, years.

To realize maximum production, labor and industry must continue to make agreements—and to keep them. It is imperative that differences shall not stand in the way of the defense effort. Personal ambitions of labor leaders must take second place after the good of the nation. The aspirations of one man, or group of men, must not be permitted to paralyze a whole industry. That the rank and

file of labor feels this way was demonstrated in last November's elections.

Granted industrial peace during the trying period ahead, production must be for military purposes first and civilian uses second. During this era there will be, undoubtedly, as nearly complete employment as there ever has been. This will mean unprecedented purchasing power in the hands of the civilian population. With production of civilian goods at the minimum to supply essential needs, there exists a grave danger of runaway inflation in the competition for scarce items. To prevent this inflation, with its danger of economic collapse, non-military demand must be kept down in balance with non-military supply.

There are two routes to this end. The first indicates alteration of a basic human trait—the desire to acquire possessions. To try to change such a fundamental characteristic is impractical. The second component of demand—purchasing power—seems to be left as the sole road, and the mechanisms of higher taxes and freezing of wages are likely to be invoked.

Care must be exercised, however, that revenue realized from increased taxes is used to defray costs of the defense effort and not for unnecessary government spending. Our leaders should set the example of curtailing non-essentials to meet emergency needs. It must also be recognized that the tax level, if pitched too high, kills incentive to work. A case in point is offered by the coal industry in the United Kingdom—where absenteeism and slowdowns were the result of taxing miners' income so heavily they felt it was not worth while to mine the extra ton of coal which would mean the next higher income bracket.

Just as too high an income tax can kill incentive for the individual, so can an unrealistic excess profits tax kill incentive for corporations. The recently enacted tax law contains many features the effect of which is far from clear, and which may need revision to avoid penalizing sorely needed production. While the law recognizes principles which are important to the success of mineral exploration, production and development, there are further provisions urgently called for to remove tax barriers that may impede our defense program at a time when strategic and critical mineral production is so essential.

As the Korean "police action" becomes a series of masterly retreats, and the tensions in Europe grow tighter, it becomes increasingly important for all of us to pull together for the defense effort. President Truman has prophesied a 10 percent reduction in the American standard of living. If this will save the lives of American soldiers on the battlefield and preserve our system of life, it will indeed be a small price to pay. The start of a New Year is the traditional time for resolutions. Let us resolve now to back up the defense effort with record production, restraint in buying and a selfless devotion to the ideals of the American way of life.



Cone separator was replaced by drum type

Operating Factors In Heavy-Media Processing

Part I—Development of New Equipment Paces Advance in Separation Methods

By L. J. ERCK
Chief Metallurgist,
Cleveland-Cliffs Iron Co.

THIS subject has been covered by many people since its inception and a bibliography of the papers, articles, general presentations and reports would be formidable. The remarks here are confined to the further development of this scheme as applied to iron ore and particularly to the more recent advancements that have been made in the concentration of iron ores on the Mesabi Range.

Many recent presentations have touched upon the history of the Heavy-Media process but it might prove beneficial to summarize this history and particularly that of ferro-silicon and how it played its part in the general concentration of ores.

Butler Brothers were originally in-

terested in the scheme of Heavy-Media during the winter of 1936-37. This being based upon the apparent success of the operation at Mascot, Tenn., in which galena was employed as a media. The process was then commonly called the "Differential Density Heavy-Media Process," utilizing a definitely established differential in gravity in the cone separator. The amenability of the scheme was tried out at the Mines Experiment Station at the University of Minnesota and found to be applicable, as determined by a series of tests.

Then, a plant was designed and constructed at Trommald, Minn., for concentration of manganiferous ores. Construction was completed in 1937.

Unfortunately, the operation was distant from the original source of galena, a situation that proved to be the determining factor in discontinuing the effort. The galena, although making a suitable media, was friable and reduced in size until it was no longer suitable. Coarser media had to be added to retain the fluidity necessary. In this way the ore season was completed with an extremely high media loss per ton of product.

In these early days, transportation of the heavy media was not worked out and much power was expended in moving the media around the flow-sheet. By the same token, the only means for recovery known were those being used in the original flowsheet. Much more can be said about the dismal and difficult days encountered in trying to operate this plant, but the experience gained paid off many times over as the idea of Heavy-Media separation was accepted and a trail was marked for determining a more suitable solid to be used.

This actually was worked out at the Mines Experiment Station at the University of Minnesota under the direc-

tion of H. H. Wade, at which time 15 percent ferrosilicon was suggested. This media has a maximum resistance to oxidation and maximum magnetic susceptibility. Ferrosilicon pig of this composition, ground to 65 mesh and mixed with water to the extent of 80 percent solids, produced a desirable media. From this point on the technology of the process was developed, growing from the original 6-in. cone employed for the first tests, through the 3-ft cone used for pilot work at the Experiment Station, thence to a 4-ft cone operated on the Mesabi Range on a 24-hour basis and finally to the first commercial unit, which was constructed at the Harrison Plant at Cooley, Minn.

Present Status

It is interesting to trace the progress made through the many installations which are now operating or are being anticipated. In many instances the original test work was conducted by the American Cyanamid Co. At first, Butler Brothers were besieged with requests to treat and test samples by this new and unique method. Their research personnel was more than relieved to find that American Cyanamid Co. was ready and willing to step in and take over this tremendous responsibility. The actual contributions they have made stand as a testimonial to the excellent work they have contributed through their Mineral Dressing Division.

Likewise to be noted are the many machinery manufacturers who were quick to recognize the extreme possibilities being presented. The cooperation and guidance offered through their experience in manufacturing equipment that might prove beneficial in developing the flowsheets, has in

the same manner assisted in furthering the rapid advance of this process.

The first effort, of course, was to concentrate lead-zinc ores at the plant of the American Lead, Zinc & Smelting Co. at Mascot, Tenn. From there the effort extended to the plant on the Cuyuna Range to establish a continuous operation for concentrating manganiferous ores. Then the process extended to other corners of the world, separating materials all the way from the lowly concrete aggregate to the recovery of diamonds in the Transvaal. The plant of the Premier Diamond Mines, located at Transvaal, has in the pilot stage treated 550,822 loads. Of this, 507,793 loads were of mine ground from which an average yield of 24.37 carats per hundred loads were realized. The remaining 43,029 loads were from old dump tailings, from which an average recovery of 12.33 carats per 100 loads was made.

Equipment Development

The first flowsheet used was patterned after the original being used at Mascot, Tenn. It was quite apparent, after going through the initial stages of this problem, that concentration of manganiferous ores was entirely different from that of lead-zinc, in that recoveries of 75 percent and higher were realized. Even a combination of the best imaginations at that time could not develop anything more practical than the 70-deg cone being used with an internal air lift and all its inherent difficulties. With 75 percent of the weight sinking, the tonnages being treated at that time put the operator in a precarious position. He could not move from his air lift station without finding himself in the unfortunate case of having a cone full of sink product because

About the Author

L. J. ERCK, chief metallurgist, the Cleveland-Cliffs Iron Co., graduated from the University of Minnesota School of Mines in 1933. After this he worked for Butler Brothers at Cooley, Minn., for 13 years, during which time he was in charge of research development and plant control work.

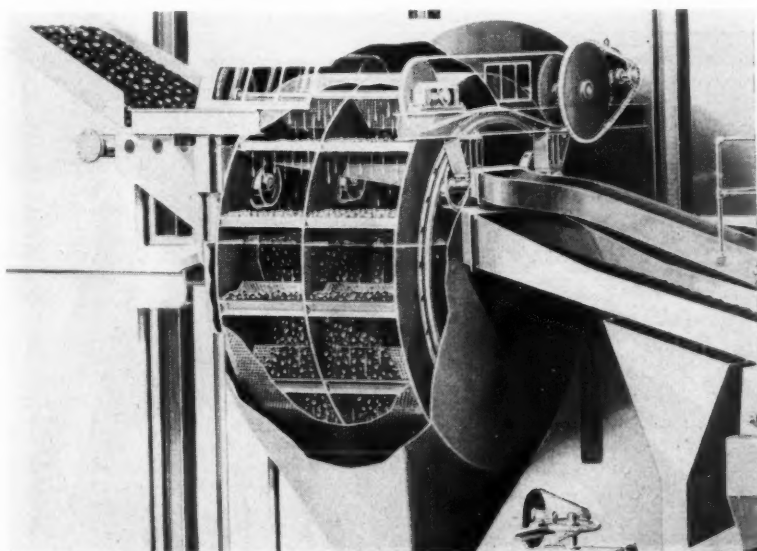
In 1948 he started as chief metallurgist with Cleveland-Cliffs Iron Co. at their ore test laboratory located at Taconite, Minn. He is now working at the company's research laboratory at Ishpeming, Mich. His long experience in research and development work has made him well qualified to report on this important phase of ore beneficiation.

the air lift had become plugged. The only remedy was arduously to empty the cone and start over.

The first development trend in separators was towards what is known as the closed top cone. This was, in essence, two 60-deg cones joined together at the maximum diameter. The concentrates were removed from this cone by an external air lift that made it possible to unplug when air lift difficulty was encountered. The overflow was reduced to a minimum diameter, thereby producing a differential rising velocity resulting in a positive elimination of all tailing and middling particles which heretofore had resulted in excess accumulation as far as the open top cone was concerned. The closed top cone served its purpose during the early years and can still be considered an efficient piece of equipment, provided the percentage of tailing or float material does not exceed 40 percent of the weight. At this point, the excessive amount of tailing interferes with operation, and results in tramp float in the sink product.

The Colorado Iron Works Co. recognized the necessity of a more efficient separator. One which would have a positive removal of sink product irrespective of the ratio of concentration was indicated. Such a separator would also eliminate the use of an air lift and the high horsepower input required for producing the air necessary for removal of the sink. Initial test work in this respect was carried on at the Harrison Plant and finally resulted in the first commercial installation of the Akins Heavy-Media Separator at the Patrick Plant at Cooley. It appeared for some time that the Akins Separator represented the ultimate in mechanical as well as metallurgical efficiency.

It wasn't long, however, before the field again became active in further developing the Heavy-Media separators, which in principal paralleled that of the Akins. The first of these was the Hardinge Counter-Current Heavy-Media Separator which was developed



Drum type separator eliminated power consuming air-lift

at the Taconite Laboratory of the Cleveland-Cliffs Iron Co. and first tried at the Hill-Trumbull Plant.

This effort was closely followed by the drum as proposed by Western Machinery Co., now being operated at two plants, one in Minnesota and one in Michigan. Two other drums have likewise been developed in the more recent years, namely by the Link-Belt Co. and the Nelson L. Davis Co. They are being used on coal separation with magnetite as a media. How much further development work will go in the way of establishing newer designs in Heavy-Media Separators to reduce horsepower input, maintenance and repairs and at the same time improve metallurgical practice is difficult to say. One fact can be stated for sure, that the trail has been blazed and the challenge firmly accepted by machinery manufacturers.

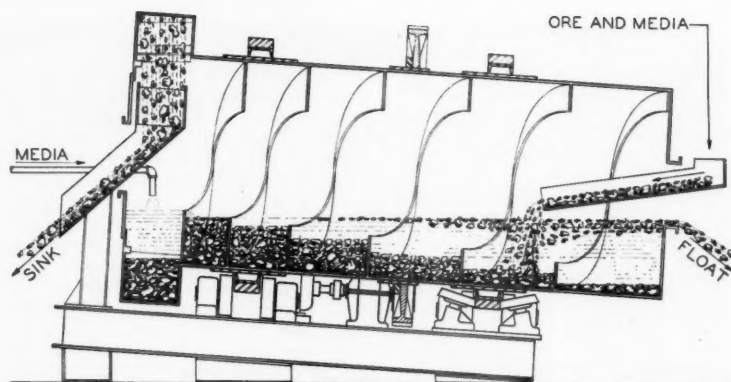
Auxiliary Units

Advancement has been paced by progress in auxiliary equipment such as screens and pumps. Considerable improvement has been made also in screen cloths to minimize blinding and increase cloth life. The Cleveland-Cliffs Iron Co. has found the wedge slot screen, manufactured by the Hendrick Mfg. Co., to be considerably better than the original punched plate used. In some instances it has been possible to install the wedge slot in the spring and operate all season without making a change.

The cost of the wedge slot cloth is considerably more than the punched plate but time saved by eliminating stops to clean the cloth as well as the hours lost in changing punched plate has more than made up for the difference. The benefits gained from advanced designs in screens and pumps are the most difficult to measure, but the efforts made by manufacturing companies are appreciated by operators and even though the advantages gained are not as spectacular as for the separators, they definitely play as important a part as any other piece of equipment in the flowsheet.

The next most spectacular advance made in equipment used in the Heavy-Media process is that of the magnetic separators. Until recently one type of magnetic separator was used exclusively for the recovery of the magnetic ferrosilicon as well as magnetite. The design of this magnetic separator was particularly good but the company manufacturing these separators continued to study the problem and changed the design twice. The most recent change has simplified installation in the plant and increased efficiency in recovering the ferrosilicon.

A competitive company has recently submitted a new design which is being tried at one of the plants on the Mesabi Range. Two other companies have likewise redesigned their mag-



Counter-current heavy-media separator permits finer separation

netic separators for recovery of ferrosilicon and magnetite and have in both cases installed equipment for trial or commercial operation.

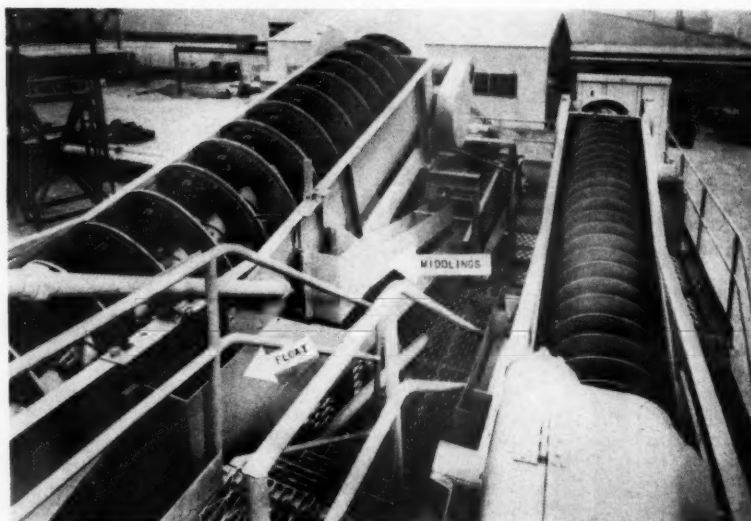
It is still a cold fact that efficiency continues to pay off in the long run. In other words, the field can be invaded only for as long as the best equipment meets the operator's specifications. If present results are not acceptable, then a magnetic separator presenting better results is adopted. It will only be a matter of time until new designs are presented and, as is always the case, the operating plant will continue to be the guinea pig in determining whether or not the advantages claimed are sufficient for replacing the old with the new.

Likewise the densifier has played an important part in the flowsheet of the Heavy-Media process and represents a development that took place during the early stages when trouble was being encountered in getting high specific gravity solids in and out of the thickeners. The densifier was originally a conventional type Akins

classifier. A series of changes indicated that by causing the particles to flow in the same direction as the rotation of the spiral, extremely fine separations could be made, particularly when the media was magnetized.

No change has been made in recent years and basic design has always been accepted where applicable to the problem. In the case of fine magnetite, considerably more settling area would have to be used than is available in even a duplex densifier. The last two years have likewise seen this field invaded by competitive equipment in which the Hardinge counter-current classifier has been employed successfully as a dewatering device to prepare the feed for magnetic separators. Most recent development in magnetic separators might mean elimination of the densifier from the flowsheet. Such a flowsheet is now being practiced at the Canisteo plant of the Cleveland-Cliffs Iron Co. at Coleraine, Minn. This plant has definitely eliminated the wash water densifier and although

(Continued on page 43)



Densifier has been an important part of flow sheet



Electric cables are the lifelines of modern mechanized mines

AC Power Cables in Coal Mines

THE first attempt to use an insulated conductor underground for transmitting electric power in the United States was in 1844, when Samuel F. B. Morse tried to lay a telegraph cable between Washington, D. C., and Baltimore, Md. Gutta percha was used for insulation. The project was abandoned in favor of a line mounted on wooden poles because of difficulties in applying the insulating material and making splices.

The invention of the dynamo and electric light led to the development of the present power cable from the original Edison system of copper rods in iron pipes filled with asphalt to the modern multi-conductor, lead-sheathed, gas-filled cable.

In the early days cable was not used extensively in the United States due to the high first cost and the fact that our cities were new, with wide streets that permitted overhead construction. On the other hand, the development and use of underground cable in Europe was influenced by the need of a distribution system adapted to centuries-old cities with narrow winding streets.

Cable for supplying 3-phase power inside mines has been used, with varying success, ever since the mines changed over from local steam-driven d-c units to centralized a-c power.

Cable may be divided into four general types:

Proper Selection and Installation Assure Best Performance

By R. C. GIVENS

West Virginia Engineering Co.,
Charleston, W. Va.

- (1) Single conductor
- (2) Round conductor belted
- (3) Sector conductor belted
- (4) Shielded conductor "H" type

Single conductor cable is used in short bore holes and also in conduit. It can be built for voltages up to 132 kv. If it is rubber insulated for 5000 v or more it should be shielded.

Round conductor belted type cables usually consist of three, four or six conductors, individually insulated. They are then cabled and the interstices filled with jute. An over-all belt of the same insulating material as on the conductors is applied and the outer jacket is added.

Sector conductor cable is similar in construction to the round conductor except that the cross-section of each conductor is the sector of a circle. This type cable supplies 33 percent more conductor area than a round conductor cable with the same outside

diameter and insulation thickness. The first cost of sector type cable is much higher than round, therefore it is seldom used except when larger capacity is required in an existing duct system.

In the Hochstadter, or "H" type, cable each conductor has a metal tape over the conductor insulation. The conductors are cabled, the interstices filled and the outer jacket applied. Belt insulation is not used. This type has the advantage that tangential stresses and high ionization losses in filler spaces, inherent weaknesses in the belted type, are avoided. Corona, or glow discharges, that pin hole rubber insulation are eliminated, permitting the use of thinner insulation and a smaller outside diameter.

In standard stranded cable the shielding is usually tinned copper or monel metal tape over a semi-conducting tape on the insulation.

About the Author



R. C. GIVENS of the West Virginia Engineering Co. received most of his cable experience with the South American holdings of the Electric Bond and Share Co. During his stay in Latin America, he became so well versed in cable installation and use that he was called upon to lecture at the University of Chile on that subject.

Since 1942 he has been actively engaged in the installation of power cables in the coal mines of this country. He has drawn on his wide experience to prepare this article for the readers of Mining Congress Journal.

Trailing cables, for power shovels, dredges and similar equipment, are shielded with a metallic braid giving greater flexibility and no tape cutting or separation.

Graphite-impregnated, cotton tape or braid and conducting rubber is sometimes used for shielding on special installations. Satisfactory splices with this type of shielding require considerably more care than for ordinary metal tape.

Insulating Materials

The three insulating materials used on high-voltage cables are:

- (1) Impregnated paper
- (2) Varnished cambric
- (3) Rubber compounds

Impregnated paper insulation consists of manila paper tape wound helically around the conductor then impregnated with an insulating compound. A lead outer jacket is imperative.

Paper insulation has high dielectric strength, lower capacitance and dielectric losses than other types of insulation. It may be operated at higher temperatures, without damage to the insulation, than either varnished cambric or rubber.

Paper insulation, however, absorbs moisture and cannot be bent on short radii.

Varnished cambric insulation for cables consists of closely woven, varnish-impregnated cotton cloth and viscous filler; the filler is a moisture repelling insulating compound, with a dielectric constant equal to that of the varnished cloth. The filler prevents the tape from unwrapping when

cut and allows the layers of tape to slide upon one another when the cable is bent. The varnished cloth in the form of tape is wound on the conductor helically with filler applied between layers.

Varnished cambric has a high dielectric strength and is not affected by ozone or corona. It will operate at higher temperature than rubber without deterioration. It may be used with a braid outer jacket but a lead sheath is advisable.

Rubber Compounds

Natural rubber compounds are made up of Para or Heva rubber, sulphur, litharge, carbon and talc, the proportions depending on the manufacturer. Prior to 1941 all rubber insulating compounds were based on natural rubber.

Synthetic rubber insulating compounds are either Buna-S or Butyl. Both are used extensively and have insulating characteristics similar to natural rubber.

Rubber compounds have a high dielectric strength and constant. But they also have high dielectric losses and are adversely affected by ozone unless shielded against corona.

Fillers and Outer Jackets

A filler is necessary on all multi-conductor cables, except the sector type, to fill in the interstices and round out the cable. On lead-sheathed cable regardless of the insulation used the filler is usually impregnated jute. Rubber jacketed cable may have either jute or rubber filler.

Jute filled cables are more flexible than those filled with rubber and therefore are suitable where frequent moves are necessary. Jute will "wick" if exposed to moisture and lets the cable breathe. The combination of wicking and breathing has been known to carry moisture several hundred feet into a jute filled rubber jacketed cable. Rubber filler is usually a part of the outer jacket. It tends to stiffen the cable but also reduces air space between conductors and outer jacket.

Most cables have outer jackets or sheaths of either lead or rubber. A lead sheath is moisture proof and not affected by soil micro-organisms. On the other hand, it is heavy and hard to handle in a mine, expensive, subject to electrolysis and to damage when dragged over sharp rocks or abrasive material. Most rubber jackets are made of neoprene. They are flexible, tough, oil resistant and have low moisture absorption characteristics.

Either type of jacket may be protected by armor but for anything except bore hole service the difficulty in handling the added weight inside the mine offsets the possible protection against mechanical damage of rubber jacketed cable. Lead-sheathed cable should be armored to protect the

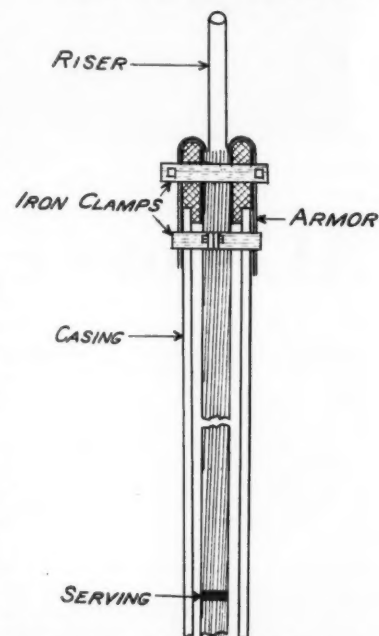
lead against abrasion and sharp rocks when pulling it into the mine.

Cable Selection

The first step in selecting a cable for mine service is to determine the conductor size. Too often cable is selected to carry the rated full load at maximum operating temperature. For mine service cable should be designed to carry the 2-hr rated load of connected equipment without exceeding the operating temperature of the insulation.

Three-conductor cable can be built for voltages up to 33,000. The usual primary voltages in mines are 2300, 4160, 6600, 6900 and 13,200. Standard cable insulation is for 3000, 5000, 7500 and 15,000 v.

Three thousand volt cable is sometimes installed on 2300-v delta systems



Rubber-insulated cable best in bore holes

that cannot be converted to 4160-Y due to connected hoist motors, fans and motor-generator sets. For installations up to and including 4160 v, 5000 v cable is recommended. For 6600-6900 v service, 7500 v insulated cable is best. On all installations between 7500 and 13,200 v, use 15,000 v cable.

Conductors in any mine with dc haulage and mining equipment will be subject to electrolysis. For this reason lead-sheathed cable should not be laid parallel to or across haulways. In ac mines permanent feeders may be lead-sheathed cable.

A most important factor in selecting cable is the length of time the equipment fed by it will remain in one location.

For permanent substations on main

haulways varnished-cambric insulated, lead-sheathed, armored cable with a ground wire in addition to the conductors is preferable.

For portable rectifiers and ac conveyor equipment that will be moved frequently, rubber-insulated, shielded conductors with rubber outer jacket and ground wires in the interstices should be used.

Borehole Cables

For borehole service three single-conductor rubber insulated cables may be used. Each cable should be suspended by a strain insulator.

Regular rubber-insulated, multi-conductor cable should not be used in boreholes over 100 ft deep. Even though the conductors have enough tensile strength to support the cable, spiraling will eventually crush the insulation between conductors. This is the reason for many borehole cable failures after only a few years' service.

Borehole cable should be rubber-insulated, shielded with a rubber outer jacket and galvanized-wire armor. A 4-in. serving, of the same wire as the armor, should be applied every 20 ft.

A lead-sheathed, varnished-cambric, insulated cable is not suitable for borehole service due to the migrating tendencies of the tape and viscous filler.

Proper Installation

Once the cable route is decided upon, sufficient space for the cable should be cleared of coal and rocks. If the cable is to lay in a drainage ditch all sharp rocks and projections that might cut the outer jacket should be removed.

Cable usually comes on 1000-ft reels. When reels can be taken into the mine the laying of the cable is very simple. The reels are set up at 1000-ft intervals and the cable is pulled into place by manpower.

Where the reels cannot be taken into the mine and when cable is to be laid along a haulway, the cable should

be unreeled on mine cars in a figure "8" and hauled into the mine. For air course installations, the cable may be hauled into position on belt rollers, if available, otherwise manpower must be used to pull the cable along the ground.

In laying the cable a few "don'ts" should be observed:

- (1) Do not haul the cable with the mine locomotive or hoist
- (2) Do not kink the cable. If a kink does occur, cut it out 2 ft on either side of the kink and install a regular splice
- (3) Do not pull the cable ends flush. Always allow at least 10 ft of overlap at cable ends to make splices. Once the splices are made, extra slack should be pulled into a breakthrough to permit splicing in case of a burnout.

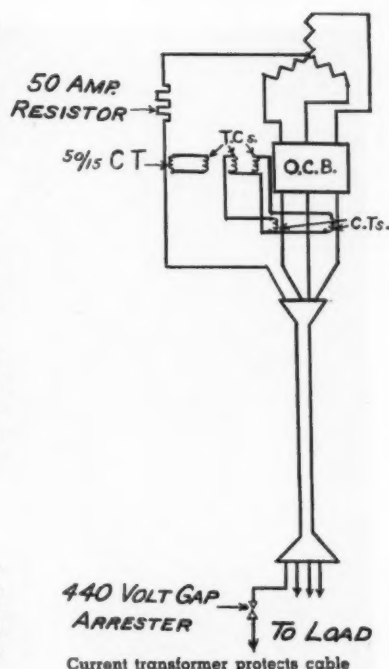
Cable Ends

Potheads are used to seal the cable ends against moisture and provide extra insulation against lightning surges. They should be installed wherever cable ends outdoors or is subjected to moisture. They also provide an easy method of opening the cable for locating faults.

Standard potheads for rubber-insulated, shielded conductor 3-phase cable with ground wires in the interstices and for varnished cambric, non-shielded, lead-sheathed cable are made up in about the same manner.

The procedure for protecting cable ends with potheads is standard.

After mounting the pothead temporarily, train cable into exact position, allowing it to extend at least 2 in. above insulators. Then mark the cable sheath between 1½ and 2 in. above entrance fitting. Disassemble pothead and place entrance fitting over the cable. Carefully remove outer jacket to mark. Unwind the shielding tape and the cotton tape around each conductor to a point two-thirds the



distance Y less 2 in.

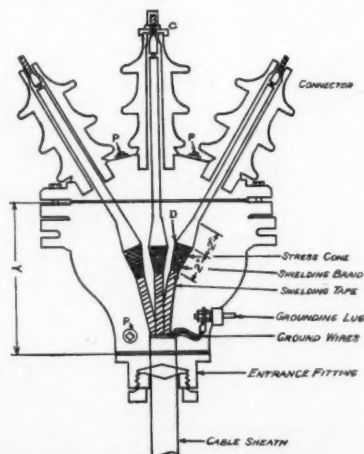
Next build stress cones by first thoroughly cleaning the surface of the conductor insulation from the end of the shielding tape to the end of the wire. Then if the cable is rubber insulated, apply a coat of rubber cement to insulation where stress cone is to be built up. When the rubber cement becomes tacky, build up stress cones with rubber splicing tape to a thickness of 1.75 that of the conductor insulation.

The bottom half of the cone should be wrapped with friction tape, lapped half, and then covered with shielding braid lapped ½ in. and tightly drawn. The next step is to wrap tightly four to six turns of small 16-20 tinned-copper wire around the top of the braid. When this has been done, solder the braid to the shielding tape and along the band wire. The braid should then be soldered together along three equally spaced vertical lines and the ground wires soldered to the shielding tape. The ground wires are fastened to the grounding lug with solder.

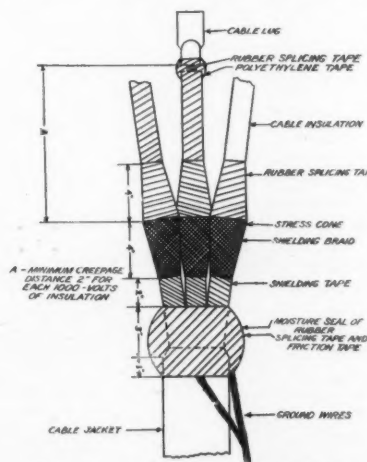
Cut the conductors to the proper length and solder terminal lugs to the conductors and assemble pothead. Remove filling plugs and insert stand pipes that extend above the top of the insulators. Pour hot compound in through one stand pipe until it runs out at the top of the insulators. After tightening the hood nuts, keep adding compound until stand pipe is full. When the compound is cool, remove stand pipes and replace plugs.

In assembling the pothead care must be taken to fit the connector in the insulator, otherwise the insulator

(Continued on page 48)



Pothead assembly seals cable end



Cable termination excludes moisture



The contract miner is the ultimate judge of equipment

Drilling Problems In Underground Rock Breaking

DETACHABLE drill bits, one-pass or throwaway bits, and tungsten-carbide insert bits, have given mining the opportunity for great economy. Impartial tests have resulted in substantial monetary savings at many operations. Impartial testing is essential because miners have resisted and condemned equipment, on its initial test, that a few months later, they would fight to retain. This resistance to change in equipment and methods may be the result of having tried out many worthless innovations but more likely it is due to an unwillingness to admit that what has been used for years may be wrong now and outdated.

For example, at the U. S. Bureau of Mines at Rifle, Colo., a hydraulic rotary drilling machine, backed by a 25-hp high pressure pump, drills eight fpm in ground where a 4-in. drifter, backed by 75-hp of compressor capacity, attained a penetration of only two fpm. The ratio of combined power and speed is 12 to 1. Besides illustrating the extremely small effective work,

Smaller Machines, Bits and Rods Indicate Solution

By J. FRED JOHNSON

Manager of Operations
Western Mining Department
American Smelting and Refining Co.

as compared to power input of the modern percussion drill, this also indicates that much is possible in the way of improvement. In fact, a gypsum mine near Las Vegas, Nev., has replaced percussion drills with 1½-hp electric drills and tungsten-carbide tipped auger drill steel at an enormous relative saving. One such machine does 400-500 ft of drilling per man shift. Thus, the flexibility of new and lighter drilling equipment may, in many mines, permit changes of technique and methods of mining that will result in economies far beyond the savings in the mere drilling of holes.

This new technique consists of

breaking rock with holes of smaller diameter, resulting in small savings in the cost of drilling but usually accompanied by large cumulative savings through the greatly increased production per man shift, reduction of 25-50 percent in air and explosives consumption and a large reduction in the capital and maintenance costs of the simplified facilities and equipment required underground and on the surface. For example, in a recent large contractor's estimate on equipping and driving a tunnel the comparative figures of capital expenditures necessary for compressing and drilling equipment were \$131,400.00 for the old larger set-up and \$62,600.00 for the

new technique. Housing and maintenance would be roughly proportional. The direct savings in drilling was established by tests to be \$.0262 per ft of drill hole or \$2.67 per ft of tunnel. A savings of 50 percent on powder was made on the test. The report containing this estimate, made by a large contracting firm that normally uses nothing but 4-in. drifters, contained the remark that the idea of small equipment would be hard to sell to other tunnel superintendents until they had the evidence of their own tests.

Rock Variation

Because of the infinitely different characteristics of hardness, toughness, structure and shattering, the new technique presents many drilling problems. Records show a range between 19,000 ft of drilling with a single bit in the most favorable rock and 120 bits necessary to drill one five-ft hole at the tough end of the scale. In this great range of rock variation some types chip readily, some must be ground to great fineness and others are extremely abrasive. These factors cause different types of bit wear and different responses to blows of the machine.

To illustrate, the hardest quality bits are also the most brittle and will not stand up against the hardest rocks. In other words, the limit of strain in a bit drilling hard rock is less than when it is drilling a softer rock. Thus, paradoxically, in drilling soft rocks a hard bit is indicated and in hard rocks a softer bit and smaller machine should be used. With hardness inverse to the numbering, No. 17 grade tungsten carbide bits are used for hard

ground, No. 12 for soft ground and, for a simple comparison with pressure cutting, No. 8 for steel cutting tools. Unfortunately few rocks are suitable to pressure-cutting by rotary drills.

Bit Changes

Since its inception, just after the Civil War, the pneumatic percussion drill has been so much improved that mine operators, gradually improving operations, have been satisfied with results attained. During this improvement in the power of rock drills, rods and bits were being placed under greater stresses. Finally, the standard blacksmith sharpened drill steel, subjected to strains beyond the skill of most blacksmiths to meet, passed out of the picture in favor of the screw-on type of mechanically-tempered detachable steel bits. With detachable steel bits came the problems in screw connection. Bit cost required that these bits receive two or three sharpenings to ensure sufficient footage to be economic.

A natural sequence was the development of the cheaper force-on connection with its thinner bit stock which offered possibilities of smaller diameter bits. These bits made feasible drilling a hole of approximately half the area, doubling the drilling speed and the depth per sharpening. Under these conditions the cheaper force-on bit was not worth regrinding or resharpening and developed into a one-use or so-called throwaway bit, considerably simplifying the work of the drill steel shop. Its use became almost universal in South Africa and Canada some years ago. At about the same time, tungsten-carbide bits were being developed for rock drilling.

About the Author



J. FRED JOHNSON was graduated from Harvard University in 1908 at a time when engineers were being fired instead of hired. As a result, he went to work as a mucker in the Centennial Eureka Mine, Eureka, Utah. In 1910 he started at the Chief Consolidated Mining Co., Eureka, Utah, as foreman and stayed there until 1917, when the first World War intervened. After the war he returned to the same company as general superintendent until 1924. At that time he entered consulting engineering practice and contracting in all western states. Since 1932 he has held the position of manager of operations, Western Mining Department, American Smelting & Refining Co. His experience from the ground up certainly makes him an authority on the subject of underground rock breaking.

They were designed particularly for hard rock. With integral steel they had the same advantage of small bit diameter that made the throwaway bit successful. Of course, the advantage of drilling a given depth of hole with grinding up of only half the material was more pronounced in hard rock than in softer rocks.

Drill Evolution

Mine operators, and more particularly contractors, had become accustomed to the practice of using larger machines and more elaborate jumbos to achieve greater speed and lower costs. This trend had progressed to a point where the use of drill rods of large section were necessary to stand the strain of the heavier machines and the breakage of steel rods was a factor often not taken into account. Heavier rods then forced the use of larger diameter bits, completing a vicious cycle of enlarging equipment.

With later development of smaller diameter bits the trend was reversed and steel of smaller cross section was used allowing further reduction in bit diameters. The use of lighter machines was dictated to avoid overstraining this lighter drill rod and the smaller diameter bits. The substitution of the air-leg for the more



Rotary drills can out-perform percussion drills under certain conditions

complicated and expensive jumbo was also a factor in reversing the trend.

These lighter drilling machines led to many competitive tests to determine which machine to use. The large variances in test results can be accounted for by considering that a primary task of the machine is to turn the drill steel a certain fixed amount for each blow. Thus, with allowances for slippage, any one machine chips or grinds off a definite segment at the bottom of the hole with each cutting edge at each blow. Hence, the correct degree of turn corresponding to each blow of the machine, the correct strength of that blow, the correct number of blows per minute, and, of prime importance, the largest machine to do this without abnormally straining the drill rod and drill bit must be used to achieve maximum penetration at the lowest cost. By luck or design, one machine will do this best in one type of rock and a different one serves best in another type of rock. Thus, there are large variations in tests and varied choices of drill machines in different mines. To sum up, there must be a correlation of section of drill steel, diameter of bit, and size of drilling machine, to achieve optimum results.

Testing Methods

To achieve this correlation some of the usual mistakes should be avoided. In the first place, the tendency is to try to test small diameter bits and rods with the large equipment already on the job for drilling large diameter holes. Both drill rods and bits are overstrained, failures result, and the method is condemned as worthless. An operator must be willing to commit himself to a program of discarding old equipment if it is found oversize. The savings of the new technique should quickly pay for the discarding of old equipment.

Each mine has its own particular conditions and problems but the following is submitted as the general procedure to use and some of the more obvious pitfalls to be avoided in the tests.

(1) Air pressures, especially with the use of jackhammers, should not fall below 90 psi at the drill when running the tests are worthwhile on pressures up to 110 psi. The use of larger machines at lower air pressures is almost always bad practice and is to be discouraged. In mines with insufficient compressor or pipe line capacity, the use of jackhammers will often reduce air consumption to a point where these become sufficient.

(2) While necessary water pressures vary greatly with hardness and types of rock, a general rule is that water pressures should range between not less than 60 psi and the air pressure used. Great variations in water pressure should be avoided.



Careful comparative tests will indicate proper equipment to use

(3) The type of drill rod and drill bit to be tested should be carefully selected, with consultation on all details with the manufacturer. From his broad experience the manufacturer can assure a greater chance of success in solving problems. As to the relative merits of cross bits and chisel bits there is much confusing data and unsettled controversy. In general, the cross bit seems necessary with larger machines to cushion the heavy blows. Chisel bits are used widely in foreign countries but are hard to sell in the United States. If an operator insists on tests with the larger machines he has on hand, he should definitely make initial tests with cross bits. It is best to buy special drill rods and bits for exhaustive tests, though manufacturers demonstrate their products for the short tests necessary for initial selection of equipment. Drill rods and bits are being improved rapidly.

(4) In making tests of a new drilling method it is usually possible to have drill manufacturers furnish

demonstrators until a selection of the most desirable machine can be made. In general a 2½-2¾-in. piston diameter machine and ¾-in. drill rod are suitable for soft and medium ground and a 3-3½-in. piston diameter machine and 1-in. drill rods are suitable for hard ground. Most drilling machines now have rifle bars of varied pitch and tests with the different rotational speeds is advised. In some cases downstroke rotation increases the drilling speed and ease of drill operation. But this is due to softening of the blow and might better be accomplished by using a slightly smaller machine.

(5) Although the object of the new method is to drill the smallest diameter holes that will properly break out and shatter the rock, some ground presents difficulties in drilling and loading 1½-in. diam holes and 1¾-in. holes might therefore be preferable. Start tests with the smallest diameter hole and switch to larger diameters
(Continued on page 36)



The new technique—small machines drilling small holes

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CRANE VALVES



A CASE HISTORY FROM CRANE FILES

PROBLEM: To choose a pressure regulator that would assure a steady, unvarying steam supply to cooking kettle for an exacting brewing process.

WORKING CONDITIONS: Regulator subject to continuous operation 24 hours per day. Main steam supply at 100 psi to be constantly reduced and maintained at 30 psi.

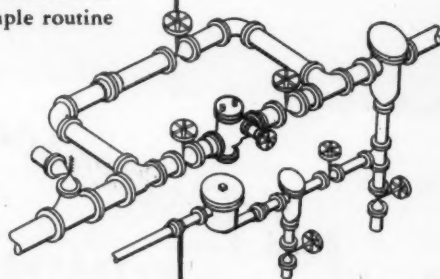
SOLUTION: Crane No. 960 Brass Pressure Regulator. (Former model with integral non-renewable cylinder.)

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Heyl & Patterson

CYCLONE THICKENER EQUIPMENT Made Possible the ELIMINATION of these SLUDGE PONDS.

In April, 1950, Heyl & Patterson Cyclone Thickener Equipment was installed at the Warwick Plant of the Duquesne Light Company, for the purpose of Closing the Plant Circulating Water System.

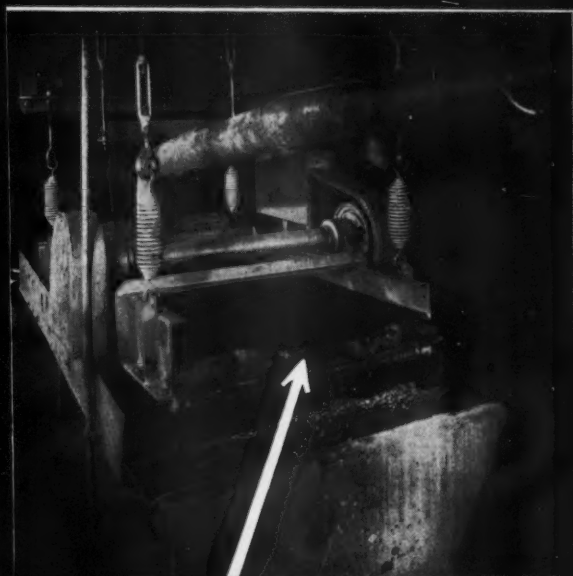
Prior to this, the solids in the circulating water were controlled by intermittently bleeding 200 to 300 gallon per minute when the circulating water approached 30% solids. Since the H&P Cyclones have been in service, the circulating water has been maintained constantly at approximately 15% solids.

The Heyl & Patterson Cyclone Thickener Equipment is very simple, consisting of: one H&P Manifold, mounting twenty-two 3" diameter cyclones; a Robins Vibrex 36" x 72" Dewatering Screen; a Hazelton 4" Centrifugal Slurry Pump.

The Heyl & Patterson Cyclone Thickener Equipment has made possible: Closed Circuit Operation . . . Elimination of Sludge Ponds . . . a more Uniform Washed Product . . . Recovery of approximately 2¼ tons per hour of 28 mesh x 0 Coal of marketable quality . . . Greater Tonnage of Washed Coal without Increase in Ash.

CLOSED CIRCUIT OPERATION

at the **WARWICK COAL PREPARATION PLANT**
of **DUQUESNE LIGHT COMPANY**



The Cyclone Thickener Unit, shown here, processes 250 G.P.M. of circulating water, having a concentration of 15% solids. The clarified overflow from the Cyclones is returned to the water system. The 26 G.P.M. of densified underflow slurry at 55% solids concentration flows by gravity to the high speed dewatering screen.

The 36" x 72" Robins Vibrex Screen, equipped

with $\frac{1}{2}$ M.M. opening wedge wire deck, receives the thickened cyclone underflow and dewateres the slurry to form a 30% moisture product and returns the effluent to the water circuit. The 30% moisture product is readily handled mechanically. The recovered product is loaded out with the prepared coal for use in the Power Stations of Duquesne Light Company.

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Belt Storage and Handling



A concrete building with earth covered roof holds constant temperature and humidity

Life Increased and Maintenance Cost Decreased Through Correct Treatment

By C. W. THOMPSON and A. E. LONG

PROPER storage and handling of conveyor belts will reduce belt mortality and also moving costs when belt conveyors are extended or recovered. Improper storage and handling, both on the surface and underground, will cause damage in several ways.

Deterioration of fabric takes place when belt rolls are stored on sides rather than in upright position. This permits moisture to accumulate between layers and underground, can create a great amount of damage if the belt has been in use and shows edge wear or gouges.

Carcass ruptures and gouges are made when steel bars are used to pry or move rolls of belt. Also when man handling and moving, sharp objects may pierce the belt as rolls are skidded along the mine floor.

Edge wear occurs when unwinding or winding rolls by hand and the belt

edges rub the conveyor framework.

Storage above ground should be in specially designed concrete buildings with roof and sides earth-covered to control temperatures. Belt rolls should be upright and kept in factory crates until time of delivery to underground sections. Specially designed handling equipment should be used to move rolls of belt into the storage building and out to mine supply trucks. Fork trucks can handle such rolls by using a ram attachment inserted through the center hole of the roll.

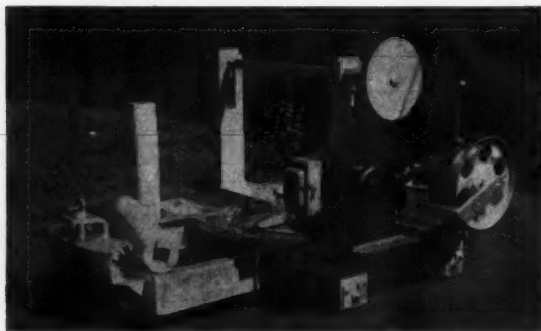
Storage underground is more difficult. Where headroom permits, rolls should be stored in upright position. Edges of layers should be coated with plastic to exclude moisture from belt plys. However, if headroom doesn't permit the upright position, circular steel plates should be used to protect the bottom side of belt roll. These plates should be larger than the roll

so the edges can be sealed around the outside wrap of the roll. The plate should also have a vertical pipe mounted in the center to facilitate fastening the plate to the roll. Belts should be stored away from power wires and moving equipment.

Moving belt rolls from surface storage to the underground location in a 42-in. coal seam is illustrated in the series of photographs on the opposite page. This is self-explanatory and it is only necessary to add that the roll contains 1000 ft of 30-in. belt; it is approximately 7 ft in diam and weighs about four tons.

When an underground belt is ready to be moved to a new location the trailer is again used, winding the belt on the vertical spool as described in the foregoing account. If the belt is not to be used immediately in another location the roll will be taken to an underground storage station. There, the circular plate will remain with the roll and the bottom will be sealed with plastic coating for moisture protection.

Another type of "Belt Winder" with a horizontal reel is illustrated below. The motor is 3 hp—1750 rpm; "V" belt reduction is about 6 to 1 ratio. Chain reduction is about 4 to



Horizontal axis belt winder

1 and is $\frac{3}{4}$ -in. pitch roller chain. An automobile transmission is used to vary speeds depending on length of belting being pulled and whether or not the belt conveyor drive is used to feed the belt to the winder. Ratio of transmission is approximately 1-2-3 to 1.

In operation the roller chain is lifted from the sprocket and the square shaft is removed. A wood spool is placed on the square shaft and shaft is replaced in bearings. Roller chain is placed on the sprockets and lifting jacks are used to raise shaft

and tighten chain. Belting is tacked to wood spool and motor is started. After belting is wound on spool, the roller chain is removed, shaft is raised by lifting jacks until the belting can be rolled off on planks either onto separate truck or into storage room.

The winder is mounted on a turntable which permits lining it up with room heading regardless of the angle at which it meets the car storage track. Guards are installed over belt and chain reduction when winder is in use. Wood spools are made by nail-

ing four square pieces of wood together, turning them to about 6 in. diam and banding with armature banding wire near the ends.

In both methods belt life is increased and moving costs are materially reduced which pays for storage buildings and moving equipment in a very short period. For example, with mechanical equipment only one man is required to handle the large rolls of belt above ground, and two men are able to move and install 1000-ft rolls underground in a coal seam averaging only 42 in. in height.



Crated belting is removed from storage building



Lift truck carries 1000-ft. roll to portal



Electrically-operated belt winding trailer . . . removes belting from crate to vertical spool



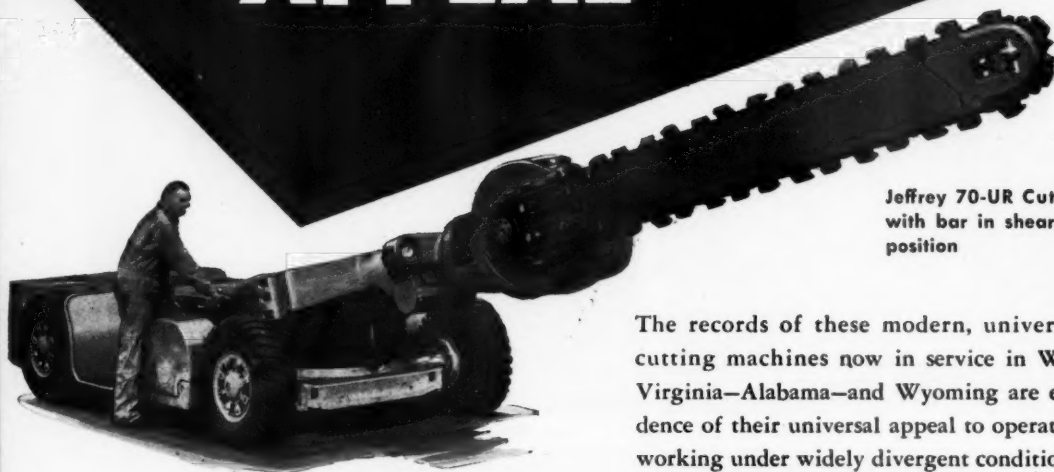
Trailer with belting is hauled underground to panel entry



Belt is unwound for installation by conveyor drive

A UNIVERSAL CUTTER

with UNIVERSAL APPEAL



Jeffrey 70-UR Cutter
with bar in shearing
position

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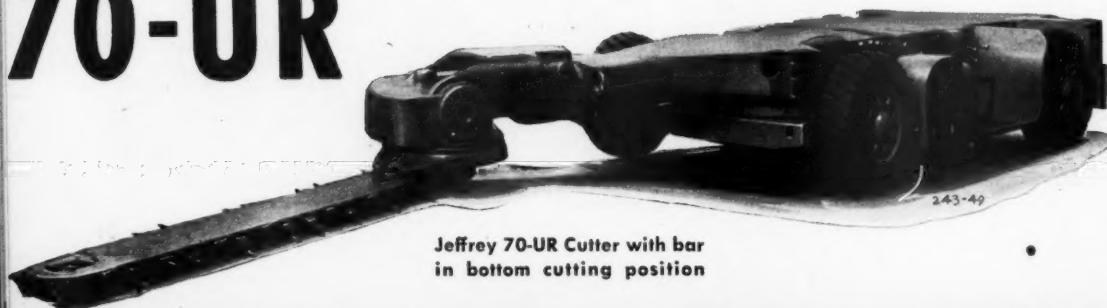
JEFFREY



Jeffrey 70-UR Cutter with
bar in top cutting position

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70-UR



Jeffrey 70-UR Cutter with bar
in bottom cutting position



● This picture really brings out the sturdy construction and massiveness of the Jeffrey 70-UR Universal Coal Cutter. It is shown making a shearing cut in the mine. Full hydraulic controls provide ease of operation for all adjustments and feeds. Trimming and cable reel operation are also hydraulic.

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Screens
Shuttle Cars
Transmission Machinery



Ore bodies lie along range-front fault

Getchell Mine Study Demonstrates Paradox of Scale

**Structural Geology Requires Map Combinations to
Establish Accurate Relationships**

By PETER JORALEMON

Geologist
New Park Mining Co.

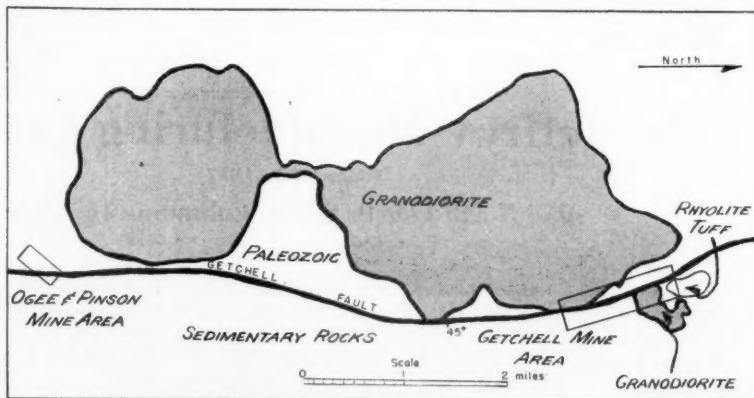
GEOLOGIC maps have become the most useful and surely the most used of the ore-finding tools of the geologist. Like many industrial tools, however, such maps may be dangerous when used wrongly.

In any mine, the underground maps are generally all drawn to a common scale. In routine, day-to-day mapping, the mine geologist may find that he has allowed himself to think in the same scale as his maps. That is, structural features either too small or too large to appear on his mine maps may lose their significance and be ignored. The Getchell mine may illustrate how the apparent structural control of an ore deposit may change with the "scale" of geologic thinking. The geology of the Getchell mine has been previously described by Hardy.*

* Hardy, R. A., The Geology of the Getchell Mine. AIME Trans., vol. 144, pp. 147-150, 1941.

A reconnaissance geologist, mapping on a scale of an inch to a mile, would

note that the mountain range in which the deposit occurs is composed of a core of granodiorite in the form of a figure "8" stock, with sediments to the east and west dipping away from the igneous contact. He would further note that a strong and physio-graphically prominent range-front fault lies tangent to the eastern contact of the stock with a limestone-argillite series. The Getchell ore bodies lie



Small-scale map indicates ore locus along fault

along this fault between the point of intersection of it with the granodiorite and a pipe or cone of rhyolite tuff that occurs about a mile farther north. The location of the fault and the ore bodies would suggest to this geologist that the control of faulting and thus of ore deposition would be the granodiorite contact. The major plane of weakness would logically lie along the contact of a massive intrusive body with the weaker sediments. The loci of possible additional ore reserves, based on a "mile-to-the-inch" scale of thought, would lie along this ten-mile long fault, on either side of the known ore bodies.

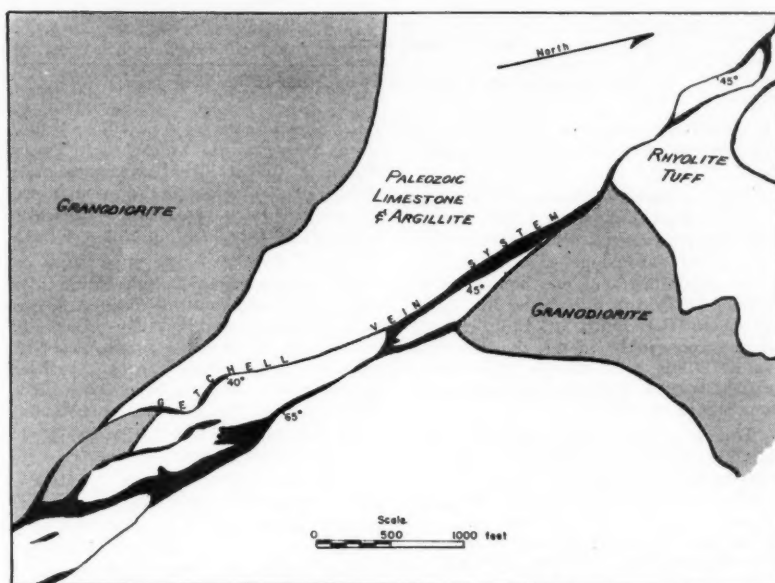
When the deposit is examined on a

500 ft to the inch scale map, the simple normal fault as viewed on the mile to the inch scale map is seen to be a complex fault system. The importance of the granodiorite contact now appears to be insignificant. The gold veins lie, not only along the major fault, but also along hanging- and foot-wall branches. The fault system appears to have begun as a simple rift fault, with nearly horizontal displacement. The fault in its early stages, then, was a single tenuous and rolling strand, striking north and dipping moderately to the east. Later normal movement took place along the early rift fault and at that time, steep branch faults were formed above and

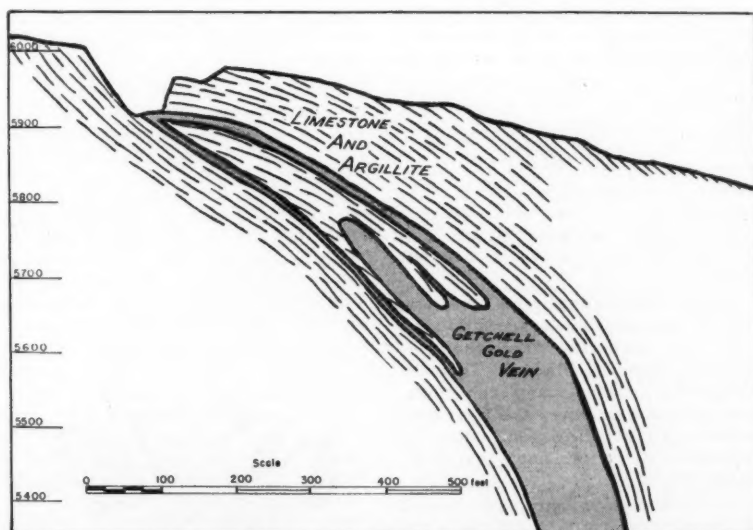
About the Author



PETER JORALEMON, geologist, went from investigating Nevada tungsten deposits and South Dakota pegmatites to three years of Pacific sea duty as Ensign and Lieutenant (jg) in the U. S. Navy. Upon his return from the war he worked with the USGS doing reconnaissance geology in the Belt Mountains of Montana and then returned to Nevada as geologist at the Getchell Mine. He is at present on the geologic staff of the New Park Mining Co., Keetley, Utah. It was during his stay at Getchell that he collected the information contained in this authoritative paper.



Simple normal fault becomes complex when mapped in more detail



Fissure veins now seem to be replacement bodies

below sections of the ancestral fault where the dip flattened. The structural ore control as viewed on a 500-scale map is the flat-dipping foot-wall fault and the numerous steeper hanging-wall strands that, although more discontinuous than the former, commonly contain veins of as much as several hundred foot widths. The 500-scale geologist would search for extensions of the ore body, not along the strike of the Getchell fault, as suggested by the reconnaissance man, but at right angles to the strike. Physiographic features that might suggest echelon branches to the main fault would be thoroughly investigated.

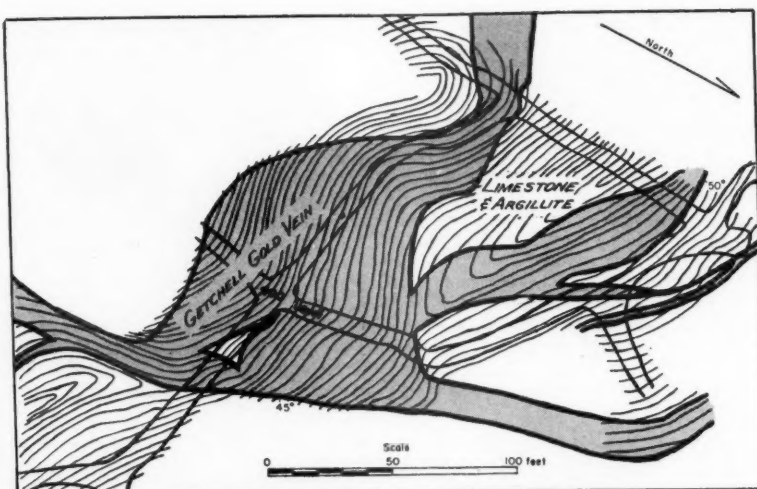
When the deposit is mapped on a 30 ft to the inch scale, radical changes in the apparent ore control are seen. The veins that appear to be typical fissure veins on the smaller scale maps are now seen to be large, lenticular replacement bodies that more or less parallel the bedding of the sediments and lie within the Getchell fault zone. Much of the ore in these bodies is in a clay-like material that appears, at this scale, to be a fault gouge. In those zones of the deposit where the fault parallels the bedding, the veins seem to be controlled by the fault, but in the north half of the deposit where the bedding swings away from the fault, the veins follow the bedding. Tight folds in the sediments have had a profound effect on the vein which pinches and swells with these folds (Fig. 4). The geologist accustomed to thinking on a 30-scale will look for the vein in places where the attitudes of the sedimentary

rocks is at variance with that of the strands of the fault zones. He will look with suspicion on any sharp folds in the sediments and will tend to place as much emphasis on the sedimentary structure as on the fault system as an ore control.

Finally, let us look at the ore on a microscopic scale, with a magnification of about X3000. At this scale, a large proportion of the gold particles are actually visible, and the factors controlling their location may be studied in detail. The ore is composed largely of a black, sooty inter-growth of amorphous carbon, calcite, and fine-grained quartz. Disseminated through this material are the sulphides, pyrite, marcasite, realgar, and orpiment. Much of the "fault gouge," as detected by the 30-scale view of the ore may now be recognized as a product of hydrothermal mineralization, a fine-grained intergrowth of euhedral quartz crystals and carbon that actually replaces wall rock and earlier gangue minerals.

The gold occurs in all minerals in the ore but by far the strongest control is the carbon. Narrow seams and layers of the vein that are rich in carbon are, with but few exceptions, hosts for rich gold shoots. At this scale, no evidences of faulting can be seen, and sedimentary structure appears to have had sole control on ore deposition. The mineragrapher will, in his search for gold, look for carbon-rich sections of the vein, and particularly for extensions of the soft, clay-like gumbo that is so commonly a carrier of rich gold values.

By combining all of these "views" of the deposits, and only in this way, can a clear idea of the true structural control of the ore occurrence be found. Thus, the Getchell deposit is made up of a series of replacement bedding veins that are localized along and between the various strands of the complex fault system that parallels the mountain range. Within the veins the gold distribution is erratic and is con-



On 30-scale sedimentary structure is as important as fault system

trolled largely by the distribution of carbon, an earlier hydrothermal mineral.

Each of these localizing factors has been proved important. The reconnaissance geologist wanted to search along the extensions of the Getchell fault for additional ore bodies. The Ogee and Pinson gold mine lies eight miles to the south of the Getchell mine, apparently along the Getchell fault. This has, in the past three years, been a rich though relatively small gold producer.

The geologist with the 500-scale mind suggested searching at right angles to the main vein for branch veins. In the southern third of the Getchell deposit, nearly 100,000 tons of ore have been mined in the past year from branch veins that did not outcrop and whose importance might have been overlooked without the 500-scale study of the detailed fault structure.

The 30-scale man is interested in the sedimentary control of the veins. The large northwest extension of the de-

posit parallels the bedding where it lies at a 45-deg angle to the main fault which is, in this area, unmineralized. A lack of awareness of the importance of sedimentary control on the ore might have failed to find almost a half million tons of ore.

The microscopist cannot claim any major discoveries but his findings serve to aid mining methods by giving a rapid and dependable guide to the megascopic recognition of the richer gold shoots. His findings will also aid in solving metallurgical problems.

This presentation of the complex subject of the Getchell geology is written, not so much to explain the structure, which has been adequately described elsewhere, as to point out the values of geologic open-mindedness. Geologic mapping, invaluable in mine operations, becomes nearly valueless when allowed to control the mind of the geologist and blind him to features merely because they appear insignificant when drawn to the scale of his maps.

Drilling Problems

(Continued from page 26)

only if necessary. The skill of available miners often determines the practical hole dimension to employ.

(6) When tests have been completed and before a decision is made, it is well to leave both drill set-ups in the heading and note which the miner, preferably a contract miner, uses to accomplish his work. After all, the work has to be done by the miner and, if the new method has not resulted in the accomplishment of this work at a saving of labor on his part, it will not be a success and can be considered not applicable to that particular job.

(7) Many mines have been visited and studied where variations in use and adaptations of this new technique

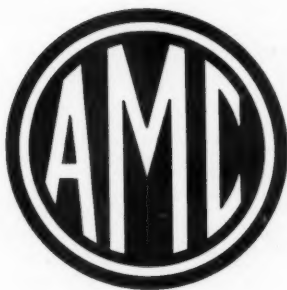
in mining have been worked out. These cover all types and sizes of operations, from the prospector who is working a property out in the desert wilds to large established mines. The complexities and apparent contradictions met have been amazing and indicate the folly of discrediting any new ideas.

Anyone embarking on an investigation of rock drilling is urged to visit one or two properties where the technique has been established. There he will get the knowledge and the inspiration necessary to carry the tests to a definite and practical conclusion for adaptation to his own particular drilling problems.

The rock breaking problem, as well as advances in drilling machines, rods, and bits, becomes more interesting as

one becomes better acquainted with it. Monetary benefits consistently result from such study and the proper application of equipment. While further progress is being made in developing equipment, that now available is of such good quality and design that its proper selection and adaptation to commercial use is a challenge to the enthusiasm, ingenuity, and perserverance of management and miner.





Coal Convention and Exposition

Cleveland, Ohio—May 14-17

ANOTHER record-breaking meeting is in prospect next May 14 to 17, at the 1951 Coal Show of the American Mining Congress. Thousands of mining men will gather from all sections of the United States, together with the usual quota of visitors from other countries. The Exposition will include everything relating to the mining and preparation of coal. Exhibits, exceeding in number and volume all previous displays, will show machines and equipment for all phases of underground and open-pit mining, as well as for tipples, shops and power systems.

Keyed to the problems of maximum output from men and machines, the Convention will point the way to filling any tonnage demands that may have to be faced. A full consciousness of coal's responsibility to our economy is reflected in the subjects selected for presentation at the sessions. High production, increased efficiency, better maintenance of equipment, and elimination of lost-time accidents are among the key subjects as shown in the detailed outline of the program presented here. Corollary problems of coal utilization, research and public relations are also included.

The stream-lined method of registration, adopted at the 1949 Coal Show, will be used again this year to eliminate delays and standing in line at Cleveland. All mining men and exhibiting manufacturers will be given an opportunity well ahead of the meeting to send in lists of their representatives who are expected to attend. Advance registration cards will then be made out and forwarded by mail prior to the meeting. To gain prompt admission upon arrival at the Public Auditorium it will be necessary only to present the card to one of the doormen. Full details on this procedure, including registration blanks, will be furnished with subsequent publicity releases on the Coal Show.

With a capacity crowd expected this year, arrangements have been made to utilize Cleveland's housing accommodations to the fullest. All reservations will again be handled through the Cleveland Housing Bureau, 511 Terminal Tower, Cleveland 13. Requests for reservations should be sent in promptly.

Outline of Convention Sessions

MONDAY, MAY 14

Open Morning

To permit registration and inspection of exhibits

Afternoon Session—Coal in National Defense

Coal Problems in the Defense Program
Public Relations in the Coal Industry
a. Anthracite
b. Bituminous

TUESDAY, MAY 15

Morning Session—Coal Preparation

A Symposium

By operators and manufacturers, covering various methods of wet and air cleaning and the related problems of sludge recovery, waste disposal and dust control

Afternoon Session—Roof Support

Mobile Bolting Equipment
Roof Bolting with Portable Equipment
Dust Control in Roof Drilling
Limitations of Roof Bolting
Combined Drill and Timbering Machine

Morning Session—Maintenance

Planned Preventive Maintenance
Lubrication of Mining Machinery
AC vs. DC for Face Machines
Underground Maintenance Organization

Afternoon Session—Strip Mining

Compressed Air in Vertical Drilling
Selective Elevation Drilling
Other Late Developments in Drilling
Two-seam Stripping
Breaking and Loading Coal in Strip Pits

WEDNESDAY, MAY 16

Morning Session—Mechanical Mining

Loading with Extensible Conveyors
Trackless Mining in 30-Inch Coal
Entry Development for Low Coal
Steep Pitch Operation
Slope Driving with Mechanical Loader

Afternoon Session—Drop Mining

A Symposium on Continuous Mining
Operators and manufacturers describe various machines and their uses.
Coordinating the Auxiliary Operations

Morning Session—Safety

Advances in Illumination for Coal Mines
Protection Against Electrical Hazards
Pulmonary Diseases in Coal Mining
Permissibility of Diesel Locomotives

Afternoon Session—Strip Mining

Large Augurs for Highwall Mining
Torque Convertors in Haulage Units
Latest Developments in Land Reclamation

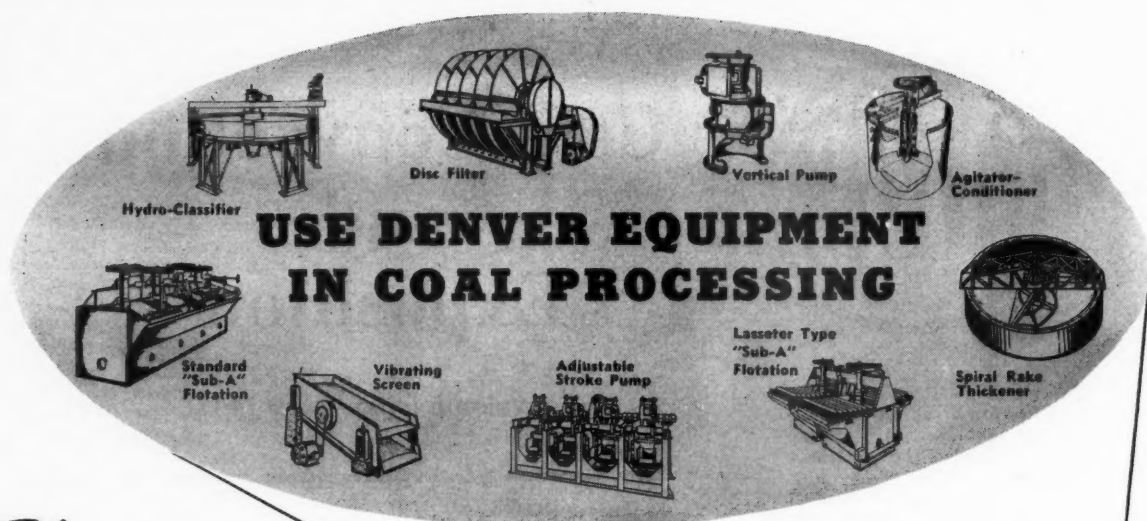
THURSDAY, MAY 17

Morning Session—Coal Utilization

Present and Future Electric Power
New Developments in Research
a. Research for Future Coal Uses
b. Coal-Burning Locomotives
c. Fly Ash Elimination

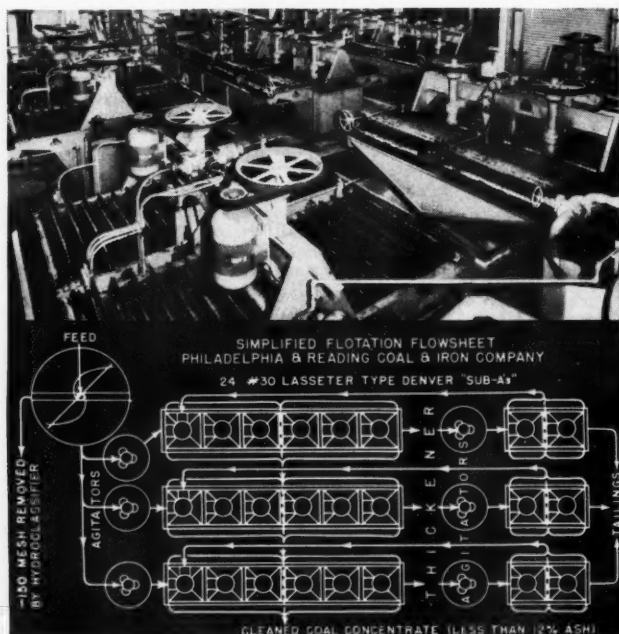
Open Afternoon

To permit final inspection and study of exhibits



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PHILADELPHIA & READING
COAL & IRON CO. Uses

DENVER "SUB-A"
 (Lasseter Type)
FLOTATION



**...TO RECOVER ANTHRACITE
 COAL FINES...LOW ASH
 CONCENTRATE AT LOW COST**

Products: Anthracite Coal Fines.

Particle Size: Minus 10 mesh to plus 200 mesh.

Tonnage: 150 TPH initial feed.

Flotation Cells: 24 No. 30 (Lasseter type)
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Flotation Feed: Ninety tons per hour
 (minus 150 mesh removed from original feed).

Flotation Concentrate: Sixty tons per hour.
 (One ton per minute.)

Ash Content: Less than 12 per cent.

Reagent Cost: Less than 15 cents per ton feed.

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Elimination of timbering increases the effective area of an entry

Roof-Bolting Benefits Ventilation

Lower Ventilation Costs Follow the Application of Roof Bolts to the Support of Airways

A Report of the Coal Division Committee on Ventilation

By WM. D. MEAKIN

THE beneficial effects of roof bolting on ventilation can be illustrated with the roof-bolting program now being carried on in a southern West Virginia mine in the Pocahontas No. 3 seam. Although roof bolting is being used in many parts of the mine and soon will be used on all mechanical sections, this report will consider only the main headings in that area of the mine where roof bolting is most important due to long-life mains involved.

Four headings constitute the mains as well as the butt entries driven from the mains. All are driven 14 ft wide on 70-ft centers with breakthroughs on 95-ft centers. The two right headings of the mains are used for intake airways, and the two left ones for returns. Return air from the butt entries is overcast across the intakes to the returns, since butts are driven off the right side of the mains at intervals of 490 ft from the haulway which is in the extreme right entry.

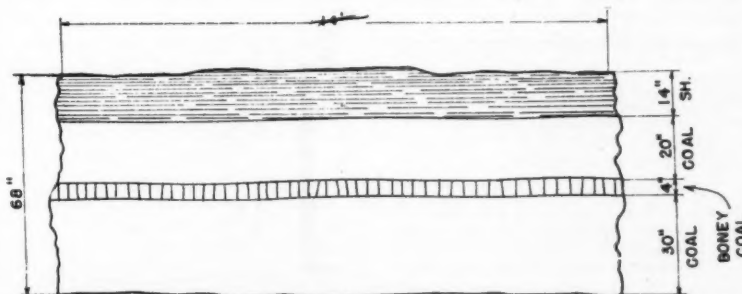
The height of the coal in that area is 54 in. Above the seam is 14 in. of drawrock which is taken in the three

airways to maintain effective area for ventilation. In the haulway additional rock is taken for haulage height. All airways are at least 5½ ft high, and the haulway 6 ft high.

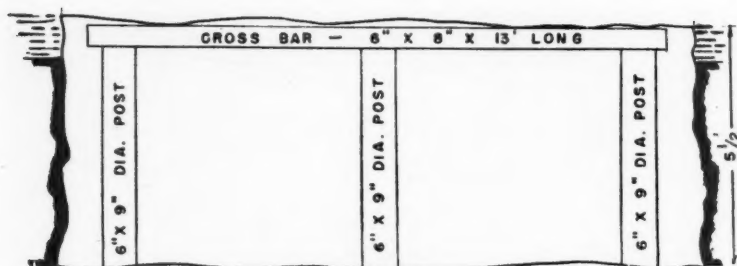
The top conditions of the mine are, in general, very poor. Immediately over the drawrock is shale that easily weathers and breaks and there are large numbers of kettle-bottoms, horsebacks and slips that cause considerable difficulty. To hold this top,

bolts are installed on 4-ft centers each way with four bolts across the width of the headings. Bolts are 48 in. long and 1 in. diam, with hexagonal nuts. 8- by 8- by ¾-in. plates and ¾- by ¾- by 5½-in. wedges.

Bolting was begun in July 1949. Since that date, 3100 ft of main airways and 7100 ft of butt entries have been developed and 3800 ft of butt entries have been retreated; in all of this work the bolts have done a marvelous job even where they were installed through drawrock. There has been only one major fall, and it occurred in a room being developed off a butt entry where the approved plan for bolting was not being followed with regard to maintaining the correct room width. Small falls of kettle-bottoms and spalling occur to some extent, but falls



Longitudinal section of coal seam



Typical timbered airway—driven area 77 sq ft—effective area 31 sq ft

of this nature cannot be prevented even with conventional timbering. Roof bolting so far has solved the problem of maintaining good clean airways in this mine, since no major falls have yet occurred to obstruct the flow of air. It has also made possible more efficient use of the airways due to absence of timber, which creates as much turbulence and loss in effective area as major rock falls.

Cost and Ventilation Efficiency

Probably the best way to show the advantage of roof bolting over conventional timbering is to make two comparisons of main entry work only, since the greatest benefit to ventilation from roof bolting lies in the main airways. Comparison No. 1 covers the costs of providing the same effective areas for both types of airways—roof-bolting and conventionally-timbered—so that the same water gauge or total pressure will be required to conduct equal air volumes in the mains. Comparison No. 2 consists of providing airways of same driven dimensions for both roof bolting and conventional timbering. In the second comparison the difference in pressure required to conduct air in the mains is used as a basis to show additional power costs. Airways 10,000 ft in length are used as a basis for determining costs.

Comparison No. 1

In order to obtain *equal effective areas* to conduct an average of 90,000 cfm the total length of the airways and back again at the same pressure loss, the areas shown in Table I are necessary to stay within the desired water gauge limits:

TABLE I

Roof bolted airways—	
1	intake (haulway), 6 by 14 ft
2	intake, 5½ by 14 ft
2	returns, 5½ by 14 ft
4 airways total	
Conventionally-timbered airways—	
1	intake (haulway), 7½ by 14 ft
2	intakes, 7 by 14 ft
3	returns, 7 by 14 ft
6 airways total	

In the roof-bolting section, only the drawrock is taken in three airways and the haulway has 1½ ft of top taken. For the conventionally-timbered section, 2½ ft of rock must be taken in all airways except the haulway, which requires that 3 ft of rock be taken.

The cost for the four roof-bolting airways as listed above, for each 10,000-ft length, with bolts installed on 4-ft centers each way, is shown in Table II:

The cost shown in Table III is for the six conventionally-timbered airways, each 10,000 ft in length, with permanent locust timbers. Cross-headers 6 by 8 in. by 13 ft on 4-ft centers are supported by three posts 6-9 in. in diam in all airways except the haulway, where only two posts are used for support.

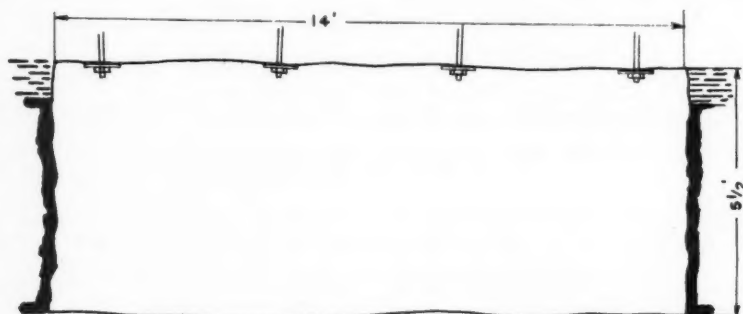
Comparison No. 2

In the second comparison, the cost, as shown in Table IV, for the preparation of the four roof-bolting airways will be the same as in the preceding estimate—\$179,400. With conventional timbers in four similar airways, the cost will be as given below. This assumes locust timber for a permanent job, using cross-headers; 6 by 8 in. by 13 ft, on 4-ft centers supported by three locust posts 6-9 in. diam in all airways except the haulway, where only two posts are used.

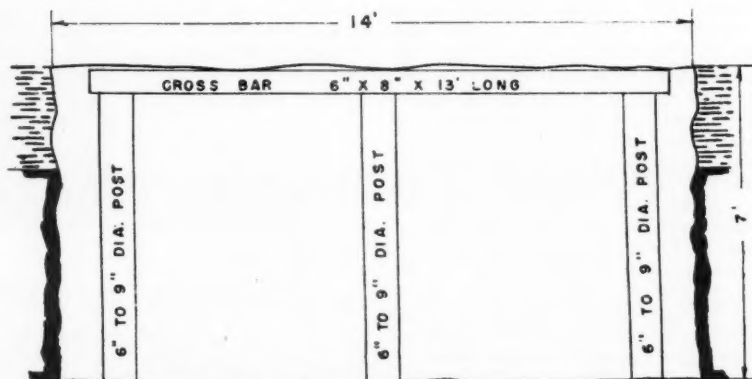
Difference in cost of conventionally-timbered airways at \$218,900 over

TABLE II

Cost for Four Roof-bolting Airways	
40,000 bolts in place at \$1.80	\$72,000
Slating in three airways, 18,200 cu yds rock at \$4 per cu yd.	72,800
Slating in one haulway, 8,600 cu yds rock at \$4 cu yd.	34,600
Total cost for 10,000 ft of four airways.	\$179,400



Typical roof-bolting airway—driven area 77 sq ft—effective area 71 sq ft



Three timbered airways driven this size—98 sq ft—give same effective area as two roof-bolting airways 77 sq ft in cross-section

TABLE III

15,000 locust header sets on locust posts at \$7.25 per set	\$104,700
Labor for timbering at \$3.90 per header	58,500
Slating in five airways—64,815 cu yds at \$4 per cu yd.	259,200
Slating in one haulway—15,555 cu yds at \$4 per cu yd.	62,200

Total cost for 10,000 ft of six airways.....\$484,600

Difference in cost: Conventionally-timbered airways over roof-bolted airways—
\$484,600 — \$179,400 = \$305,200.

TABLE IV

10,000 locust header sets on locust posts at \$7.25 per set	\$72,500
Labor for timbering at \$3.90 per header	39,000
Slating three airways (same as roof-bolted airways)	72,800
Slating one haulway (same as roof-bolted haulway)	34,600

Total cost for four airways 10,000 ft long.....\$218,900

roof-bolted airways at \$179,400 is \$39,500.

Although the roof-bolted airways are only \$39,500 less expensive than locust-timbered airways, they require considerably less water gauge and the average air velocities are much lower due to the absence of timbers. To conduct an average volume of 90,000 cfm, the total length of the airways, 10,000 ft and back again, will require 2.89 in. water gauge, or, assuming 60

percent over-all efficiency for the ventilation unit, 68.0 hp. To conduct 90,000 cfm, the total length and back again, in the four conventionally-timbered airways will require 14.69 in. water gauge, or, assuming 60 percent over-all efficiency for the ventilation unit, 358 hp.

This example shows roof bolting requiring 290 less hp (358—68) with a correspondingly lower power cost of \$20,300 per year—assuming \$70 per

hp-year. Roof bolting requires only 2.89-in. water gauge compared to 14.69-in. water gauge with timbering. The 14.69-in. water gauge in this comparison makes a setup almost impossible for conventionally-timbered airways, since to this value must also be added the split water gauge, the shaft, slope, or drift losses, if any, and the losses approaching and leaving the airways in question.

It is to be noted that in both comparisons the airways considered were assumed to be in good condition, having reasonably even ribs, top and bottom, and no rock falls. Where conventional-timbering was considered, all timbering was assumed to be in perfect alignment. This statement introduces another advantage of roof bolting, since no problem of timber alignment exists. Misalignment of timbers greatly reduces the possible effective areas in airways, as do rock falls, uneven rib, top and bottom surfaces. Airways have been observed in this mine where misalignment of timbers has reduced the possible effective area as much as 17 to 45 percent with timbering consisting of three locust posts and a cross-header on 4-ft centers for roof support.

Heavy-Media Processing

(Continued from page 20)

full-scale operation has not yet been attained, it is clearly indicated that this procedure is feasible. As can be readily seen, the manufacturers have made a widespread contribution towards not only simplifying but also increasing the efficiency of the Heavy-Media process.

Fine Ore Separation

It was thought that the lower practical limit of screen sizing treated by the Heavy-Media process was around $\frac{1}{8}$ in. This was particularly true in the design of the closed top cone when high velocities were used on the media for elimination of the middling and tailing. It was suitably demonstrated at that time that the lower limit to be treated was $\frac{3}{16}$ in. With the advent of the Akins separator, this limit was dropped to $\frac{1}{8}$ in. without any difficulty. There were always indications that it was possible to go lower in size, but it was never understood how this could be accomplished mechanically.

An earnest effort was made by Butler Brothers during the winter of 1939-1940, when a drag separator was developed to be used primarily for testing the feasibility of separating ores smaller than $\frac{1}{8}$ in. by the Heavy-Media process. It was found at that time that clear separations could be made down to 28 mesh with acceptable separations to 48 mesh. Below this

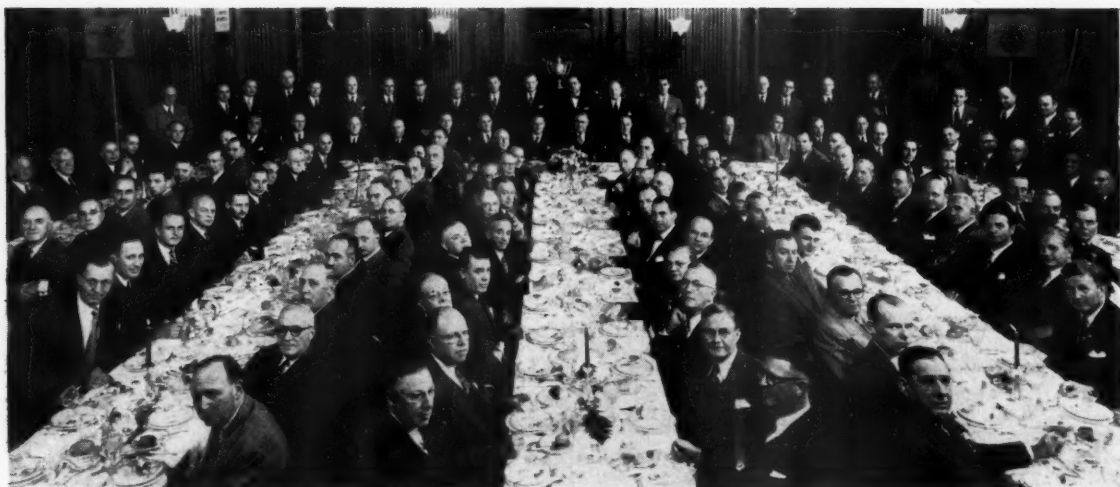
size, separations were either obscure or the recovery of the fine sink was too low to justify the effort.

This investigation might have continued had it not been for the mechanical difficulties encountered in the drag separator. With the advent of the Akins separator, the problem was again taken up and an effort established to use the Akins as a separatory vessel for making the fine ore separations. The results were encouraging but it was recognized that there would be some difficulty in cleaning sufficient media to stay ahead of advancing velocities. This prevented adequate separations, particularly in the finer sizes. For this reason work on the Akins separator was discontinued. Meanwhile the American Cyanamid Co. was investigating the possibility of the Dutch State Cyclone using magnetite as a media and treating ores $\frac{1}{8}$ in. and less in size. Initial work on some ores clearly indicated that extremely efficient separations could be made.

Now a pilot unit has been installed on the Mesabi Range and ores of all types and varieties are being treated to establish operating limits. So far, the results are extremely encouraging and indicate that there is every possibility of advancing this scheme to commercial proportions. Parallel to this, investigational work has been carried on using a new type Heavy-Media separator on $-\frac{1}{8}$ in. material which has been classified at 60 mesh, thereby making the feed $-\frac{1}{8}$ in., +60

mesh. The cyclone to date has been using magnetite as a media and the new type, ferrosilicon. It would appear that the new unit as a fine ore separator has possibilities. It is too early to say whether or not it will approach or exceed the work of the cyclone, but the investigation will be continued to determine which method is most feasible.

Operators interested in Heavy-Media separation are watching this with keen interest, for it definitely introduces the missing link in concentration of ores where Heavy-Media has up to now proven so efficient in sizes to $\frac{1}{8}$ in. and, in one instance, somewhat finer. A note might be made at this time that the Algoma plant is treating classifier product in an open top cone. This was reported in a paper by George F. Crocker of the Algoma Ore Properties, Ltd., Helen mine, Ontario, Canada. As stated heretofore, the Heavy-Media process was only applicable to $\frac{1}{8}$ in., which left a certain proportion of the crude to be treated otherwise. The development of ways and means for separating a portion of the remaining crude down to 100 mesh shows indications of closing the gap. For many years there were those who looked at the Heavy-Media process skeptically because it furnished only part of the answer. It would appear now, in light of the most recent developments, that Heavy-Media will again come forth and assume still more responsibility as far as the concentration of low-grade ore is concerned.



Representatives from all branches of mining and every part of the country were present

Annual Members Meeting

MEMBERS of the American Mining Congress met in New York on Tuesday evening, December 5, for the annual business meeting. Following dinner, President Howard I. Young welcomed them and then called for the Secretary's Annual Report.

Secretary Julian D. Conover summarized the work of the American Mining Congress in promoting industry progress, through the work of its various committees, composed jointly of operators and manufacturers, and through the annual coal and metal mining conventions and expositions; he also discussed Washington activities, and developments in the 81st Congress of interest to mining, including such matters as taxes, tariff, stockpiling, the Taft-Hartley Act, the defense production law, public land problems, social security, contract renegotiation, silver, gold, fuels studies and freight absorption.

He pointed out that the Korean war and the tenseness of the international situation had launched a broad program of rearmament which would have a heavy impact upon the mining industry. He said that the demands for increased defense production would call for a Herculean effort on the industry's part—to expand its production and to meet goals higher than prevailed in World War II. Attendant upon this, he declared, would be a siphoning off of manpower from the mines if present Selective Service policies were continued, and the mistakes of World War II were not avoided.

Mr. Conover brought out forcibly also the need on the part of the mines for maintenance, repairs and operating supplies and on the part of the

manufacturers of mining machinery for production materials with which to continue a steady flow of machinery and repair parts. The American Mining Congress had realized that this problem would crop up quickly and had, early in August, conferred with and urged upon interested Government officials the necessary steps to protect mineral, metal, coal and machinery production so that the industry would be ready to meet the requirements imposed upon it by the defense program. These officials, he said, clearly saw the need to treat the mining and mining machinery manufacturers as a unit, as was done under the War Production Board, and the centralization of all of these activities within the Interior Department was a logical result.

He reviewed the efforts of the Mining Congress, in cooperation with industry committees, to collect and provide information as to the steel and other requirements of the mines and the mining machinery manufacturers, and stressed the urgency of the Government's adopting some procedure shortly for channeling such items to the industry. In conclusion, he stressed the cooperation of all members in the organization's activities during the past year, and called for a continuation of this fine team work in the critical period ahead.

Following this report Mr. Young introduced the speaker of the evening, Dr. James Boyd, Defense Minerals Administrator who, in behalf of Interior Secretary Chapman, pledged the cooperation of the Interior Department and the Defense Minerals Administration in the task of keeping mines, smelters and mills operating at maximum efficiency, and in expanding pro-

duction of these minerals in short supply.

Dr. Boyd continued by outlining the ways in which DMA will serve the mining industry through its three divisions: the supply division headed by S. H. Williston; the requirements division whose administrator is Harold A. Montag, and the production expansion division under C. O. Mittendorf. He expressed the hope that some of the posts in his organization could be rotated to recruit the services of the best men from the field for particular jobs so that there will not be undue dislocation of key men from the mining industry.

It will be the function of DMA, according to Dr. Boyd, to serve as the prime point of contact with the Government for the minerals industry and the manufacturers of mining machinery and equipment. He discussed the methods for assisting in expansion of production through Government aid where producers could not procure such aid elsewhere. These include Government guarantee of private loans; direct Government loans; procurement contracts and accelerated amortization for tax purposes. He pointed out that although DMA itself cannot make loans or conclude procurement contracts, it can certify to RFC that the loans are necessary to the national defense and can certify to General Services Administration that procurement contracts have been carried through the preliminary negotiation stages by DMA and are just. Finally, DMA will be called upon to give advice in cases where accelerated amortization has been requested from the NSRB.

(Continued on page 48)



Wheels of GOVERNMENT



As Viewed by A. W. DICKINSON of the American Mining Congress

THE short "lame-duck" session of the Congress recessed December 22, immediately following Senate approval of the conferees' report on the excess profits tax bill. Resuming legislative activity January 1, the House quickly sent this bill to the President, and in the last hours of the 81st Congress also sent down to the White House the \$20.2 billion defense appropriation measure and a comprehensive civilian defense bill. The 82nd Session of the Congress convened at noon, January 3.

Meanwhile, in mid-December the President proclaimed a state of national emergency and named Charles E. Wilson, of the General Electric Co., as director of the Office of Defense Mobilization. Delegated to Wilson is wide authority over Cabinet members and heads of Federal agencies and power to direct, control and coordinate all mobilization activities of the executive branch of the Government, including but not limited to production, procurement, manpower, stabilization and transport activities.

Taxation

The Excess Profits Tax Act of 1950 is estimated to produce \$3.3 billion in annual revenue from corporate earnings. The bill includes an increase in the corporate surtax rate of 2 percentage points, bringing the total income tax on income in excess of \$25,000 to 47 percent. The excess profits tax rate is 77 percent, applicable to all earnings in excess of a credit based on either invested capital or average base period earnings. The average earnings credit is based on 85 percent of the taxpayer's average profits in its best three years during the base period, 1946-1949, inclusive; earnings of a deficit year to be counted as zero. The invested capital credit is 12 percent on the first \$5,000,000, 10 percent on the next \$5,000,000 and 8 percent on all over \$10,000,000. The Act sets an over-all corporate tax ceiling under which the total of income and excess profits taxes may not exceed 62 percent.

The excess profits tax becomes effective for calendar year corporations July 1, 1950, and terminates June 30, 1953. The increase of 2 percentage points in the corporate income tax becomes effective January 1, 1951, except for fiscal year corporations with taxable years beginning on or after July 1, 1950.

In the Senate, as in the House, the Tax Committee of the American Mining Congress, under Chairman Henry B. Fernald, continued to work persistently to ease the impact of the bill on mineral enterprises. Strong representations were made to the Finance Committee that no desire for revenue should be permitted to lead to taxation which will defeat or discourage production needed for the emergency, nor production which we should have to prevent uncontrolled inflation. Specific amendments were submitted to the Committee which would carry out the recommendations made by the AMC Tax Committee.

As the result of urging by Senator Millikin (Rep., Colo.) on the Senate floor, the alternative provision for coal and iron mines, originally contained in the World War II Act, was extended to all metal mines which were in operation during the base period. This alternative provision excludes from excess profits tax, one-half of the unit net income on all production in excess of the average base period production. In the case of mines which were not in operation during the base period, the Act excludes one-third of net income.

Another amendment sponsored by Senator Millikin, and now in the Act, provides that Government payments to encourage exploration, development and mining of critical and strategic minerals are not to be included as taxable income. This amendment also provides that where a Government loan for exploration or development is cancelled or forgiven, such forgiveness shall not be considered as taxable income.

The Act carries an excess profits

★ ★ ★ ★ ★ ★ ★

Washington Highlights

CONGRESS: Ball passes to 82nd Session.

TAXES: Excess profits law enacted.

AMORTIZATION: Defense certificates issued.

DEFENSE CONTROLS: Authority to DMA.

GOVERNMENT AID: Plans announced.

MANPOWER: Labor Department active.

FREIGHT ABSORPTION: "Watch-dog" committee reports.

★ ★ ★ ★ ★ ★ ★

tax exemption for domestic corporations engaged in the mining of strategic minerals. For this purpose these minerals are defined to include: antimony, chromite, manganese, nickel, platinum (including the platinum group metals), quicksilver, sheet mica, tantalum, tin, tungsten, vanadium, fluor spar, flake graphite, vermiculite, perlite, long-fibre asbestos in the form of amosite, crysolite, or crocidolite, beryl, cobalt, columbite, corundum, diamonds, kyanite (if equivalent in grade to Indian kyanite), molybdenum, monazite, quartz crystals and uranium.

In the legislative course of the Act the AMC Tax Committee made a valuable record for the future in stressing the need for the allowance of exploration and development costs as an operating expense, deductible either currently or on a deferred basis at the option of the taxpayer. This important stimulus to exploration and development with private funds was given serious attention in the Congressional committees, but its further consideration was deferred because of strong opposition from the Treasury.

Plant Amortization

Accelerated amortization of defense facilities is being handled expeditiously by the National Security Resources Board through the granting of "necessity certificates." Soon after mid-December Chairman Symington of NSRB announced that 48 such certificates had been issued to 18 steel and 3 refractories companies, totaling over \$600,000,000. Expansion as contemplated would give an added production of around 7,000,000 tons of steel ingot and 3,000,000 tons of coke.

Defense Controls to Interior

Effective December 18, 1950, the National Production Authority delegated allocation and claimant responsibilities with respect to metals and minerals and mining machinery and equipment to the Secretary of Interior. This delegation includes private transportation facilities on mining properties. These responsibilities as to coal were placed under the Secretary by the original executive order which followed enactment of the Defense Production Act.

The grant of authority with respect to metals and minerals is carried in NPA Delegation 5, which sets forth the mineral and metal products and the plants (mines, beneficiation and processing plants) which are involved.

The Defense Minerals Administration will thus determine requirements for critical materials needed for such plants for maintenance, repair and operating supplies. These will be combined with the requirements of the coal mines and of the manufacturers of mining machinery and furnished to NPA for allocation of the needed materials.

In the Defense Minerals Administration, headed by Dr. James Boyd (also Director, U. S. Bureau of Mines) the Requirements Division under Harold A. Montag is set up to assure the necessary materials for the maintenance, repair and operation of the mines and plants, and for the production of repair parts and new equipment to continue the mechanization of mining properties. Montag's Division is also charged with determining requirements for expansion programs of strategic minerals, as developed by the Production Expansion Division under C. O. Mittendorf.

Government Aid

Early in December, at the annual membership meeting of the American Mining Congress, Defense Minerals Administrator Boyd explained the manner in which it is proposed to provide Government aid, when necessary, to mineral producers. These steps include Government guarantee of private loans, direct Government loans and procurement contracts. He said the problems are to get the maxi-

mum production possible from existing facilities immediately; to develop known but unworked deposits; and to make concentrated effort to find additional ore deposits.

For the present it is planned that primary consideration shall be given to properties designed to produce one or more of the following commodities: antimony, asbestos (spinning grade), beryllium, chromite, cobalt, columbium-tantalum, copper, corundum, fluorspar, graphite (crucible flake), manganese, mica (strategic), molybdenum, nickel, platinum group metals, sulfur, talc (steatite), tungsten and zinc. It is planned that this list will be expanded, curtailed or modified in accordance with the changing national defense requirements.

Boyd emphasizes that projects must show definite promise of yielding material of acceptable grade, physical character and specifications, in amounts that will significantly improve the mineral supply position for national defense. He also said that aid in developing and mining mineral deposits will be forthcoming only when the necessary processing plants, water supply and access roads exist, or when simultaneous commitments are made to assure that they will be provided if necessary.

Geological Survey and Bureau of Mines assistance will be utilized by DMA and the activities of the three agencies will be coordinated by an operating committee composed of the Deputy Administrator of DMA, the Acting Director of the Bureau of Mines, and the Director of the Geological Survey.

Boyd stated that applications for Government aid should be sent directly to him at the Defense Minerals Administration offices, New Interior Building, Washington 25, D. C.

Manpower

Secretary of Labor Tobin is establishing 13 Regional Joint Manpower Committees which will be charged with making the most effective use of manpower under the defense program. Each of these committees is to function under the Direction of a Regional Office of the Bureau of Employment Security and similar committees are to be organized in numerous labor-market areas within the jurisdiction of the Regional Offices. Tobin hopes to persuade employers to hire through State employment services or through agencies approved by them.

The Secretary plans that the objectives of the Manpower Committees shall be the reduction of applicants' job-shopping; elimination of labor "pirating" and other unfair methods of obtaining workmen; fullest utilization of the local labor supply in given geographic areas to cut down shifts of labor; and identifying unused plant capacity and local pools of labor pos-

sessing skills that might be used in defense production, and calling them to the attention of area committees.

Freight Absorption

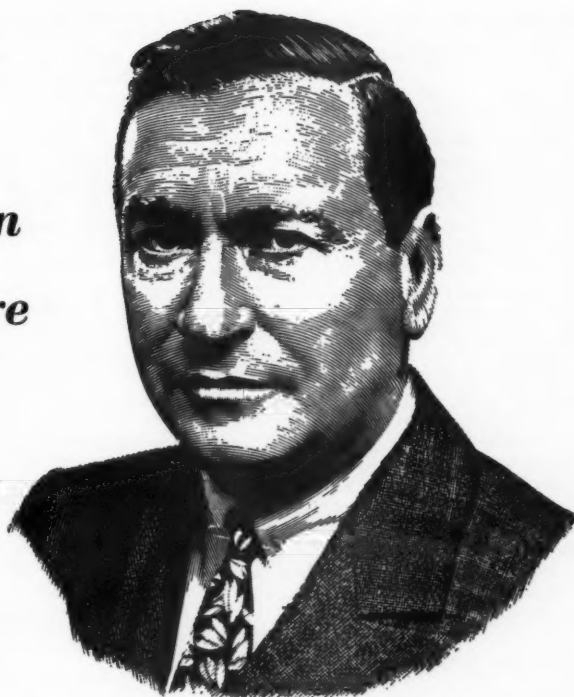
Last June the O'Mahoney Freight Absorption bill, S. 1008, ran up against a White House veto. The measure provided that producers, acting independently, may sell at identical delivered prices at different points of delivery or may absorb freight costs in good faith to meet competition. The veto message declared that the bill "would not achieve the clarification which is desired" but would "obscure rather than clarify the law." At that time Senator O'Mahoney interpreted the President's message as "clear notice" to business men that they can individually absorb freight charges and sell at delivered prices. O'Mahoney said further: "I take this to be an expression of the desire of the President of the United States that the FTC will not and should not bring any proceedings against any seller who by individual action, without combination or conspiracy, adopts either of these practices."

Based on hearings and investigations by a "watch-dog" subcommittee, the Senate Interstate Commerce Committee, in a special report to the Senate, has unanimously called upon the 82nd Congress to enact legislation to clarify the present confused situation with respect to freight absorption. The Committee staff has been directed to prepare legislation clarifying "the right of sellers to competitive freight absorption."

The Committee charges the FTC with causing much of the confusion and declares that after careful study it was unable to determine when or under what circumstances the FTC regards freight absorption as constituting an injury to competition. The Committee's report emphasizes that business is entitled to know, one way or the other, the extent to which it is lawful to compete through absorption of transportation charges and that this clarification becomes even more important in the present state of world affairs, when the Government is urging industry to expand productive capacity.



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and your country’s future
when you save . . .”***



BENJAMIN F. FAIRLESS

President, U. S. Steel Corporation

“A free economy, such as ours, is built on the savings of the people. And the future security of America depends on the initiative and the growth of every citizen. We in U. S. Steel encourage our employees to join the Payroll Savings Plan, and we are proud that the National Tube Company, one of our subsidiaries, was the first of the large industrial companies of the nation in 1950 to have more than 80% of its employees participating. Remember, you build for your own and your country’s future when you save.”

Mr. Fairless is not expressing a personal opinion, nor is he speaking for other far-seeing executives when he tells you that our economy is built on the savings of the people and a man builds for his own and his country’s future when he saves.

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\$50,000,000,000! Who *sold* all those bonds to millions of people? The answer is, nobody sold them.

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75% of the employees of Carnegie-Illinois Steel Company
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How does employee participation in *your* Payroll Savings Plan match up with the 80% of National Tube, the 75% of Carnegie-Illinois? Or, perhaps you are one of the relatively few large companies that do not have a Plan? In either case, wire or write, Savings Bond Division, U.S. Treasury Department, Suite 700, Washington Bldg., Washington, D.C. Your State Director is ready to help you with a package plan—application blanks, promotional material, practical suggestions and all the personal assistance you may desire.

The U. S. Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the G. M. Basford Company and

MINING CONGRESS JOURNAL



AC Power Cables

(Continued from page 23)

will break when the hood nut is tightened.

Where a pothead is not used to terminate a cable, a packed termination may be used. Such a termination is especially advantageous in temporary connections and ones that are moved frequently with portable rectifiers and transformers, for ac mines.

To accomplish this remove the outer jacket, shielding tape and outer tape. Build up stress cones 1.75 times the thickness of the original insulation and solder the cable lugs. Apply shielding braid on the lower half of the stress cone fastening it in the same manner as for a pothead.

Cover each conductor with one layer of polyethylene, tape, and build up the moisture seal with rubber tape and friction tape. Finally paint the moisture seal with water-proof paint, but do not paint the polyethylene tape nor use friction tape between the cable lug and shielding braid.

Safety Precautions

Cable should be protected against lightning like any other piece of electrical equipment. A set of standard

lightning arresters and a surge capacitor, rated for the operating voltage and properly grounded, will give ample protection against lightning.

With equipment fed by the cable protected against short circuits and sustained overload, it is necessary to protect the cable against short circuits only. The relays or trip coils in the oil switch should be set high enough to take momentary surges inherent in mine loads.

A 440-v gap arrester should be connected between the ground wires in a cable and the converting equipment it feeds. The arrester prevents dc from flowing in the ground wires and overheating the cable, but will arc if there is an insulation failure in the primary windings.

All mine cable installations with ground wires in the interstices should have ground fault protection. Where the system is fed from a Y-connected bank of transformers the ground fault protection is very easy. In a delta bank of transformers a grounding transformer should be used.

For a 4000-v grounded neutral system, in addition to the oil switch and overload trip coils, a neutral grounding resistor, to limit the ground fault to 50 amp and a 50/15-amp current transformer should be connected between the transformer bank neutral

and the ground wires in the cable. The secondary of the current transformer is connected to an inverse over-current relay and a tripping reactor used in conjunction with the overcurrent tripping device on the oil switch.

The cost of underground cable is approximately the same as an overhead line with the advantage that 98 percent of the cable is recoverable after the installation has served its purpose, while only 38 percent of an overhead line is recoverable after 10 years' service.

After eight years' use, 65,000 ft of rubber insulated shielded cable with ground wires in the interstices show no failures due to defective splicing or insulation, and only five due to mechanical damage, three of these were the results of too-close blasting, one was due to a rock fall and the other was the result of damage to the outer jacket when a dc feeder cable failed in a water hole. The latter failure would not have occurred had the dc feeder been properly insulated and laid in a separate duct under the haulage track.

The record for 2800 ft of four-conductor (one used for a ground wire), varnished-cambic insulated, lead-sheathed and armored cable shows only one failure which was the result of a rock fall.

Annual Members Meeting

(Continued from page 44)

Dr. Boyd called upon the mining industry to help get maximum production from existing facilities immediately; to develop known but unworked deposits, and to exert concentrated effort to find new ore deposits. "The scarcity of the products of our mines," he said, "is perhaps the most limiting factor in our economy today." He also complimented the industry on its prompt response to his request for top men to staff the new agency.

Following Dr. Boyd's address President Young introduced S. H. Williston; Harold A. Montag; Charles Connor, Defense Fuels Administrator; and William Cooke, Chairman of the newly-formed Coal Defense Committee.

Henry B. Fernald, chairman of the AMC Tax Committee, commented on current tax problems, pointing out that the language of the pending excess profits tax bill, then just passed by the House, was so obscure and so radical a departure from the language of existing tax legislation that it was extremely difficult to understand. He stressed the danger of such hastily-passed legislation and the confusion it could cause before its provisions had been defined and clarified. He pinpointed the paradox of one government department—Interior—urging all-out production of sorely-needed

metals, minerals and fuels while another—Treasury—stood by ready to penalize those who complied with the government's request for this increased output. In these remarks he was forcefully seconded by E. C. Alvord, general counsel to the Tax Committee.

The following were unanimously elected to the Board of Directors for a three-year term: Donald A. Callahan, president, Callahan Consolidated Mines, Inc.; Louis S. Cates, chairman of the board, Phelps Dodge Corp.; Andrew Fletcher, president, St. Joseph Lead Co.; Herbert C. Jackson, partner, Pickands Mather & Co.; William J. Jenkins, president, Consolidated Coal

Co.; Raymond E. Salvati, president, Island Creek Coal Co.; and C. B. Stainback, Westinghouse Electric Corp.

In adjourning the meeting President Young stressed the importance of unity in the mining industry, urging all members to take a positive interest in national policies and an active part in their formulation.

At the Board of Directors meeting following the general meeting, Howard I. Young, president, American Zinc, Lead & Smelting Co., was re-elected president; Andrew Fletcher and William J. Jenkins, vice-presidents, and Julian D. Conover, secretary.

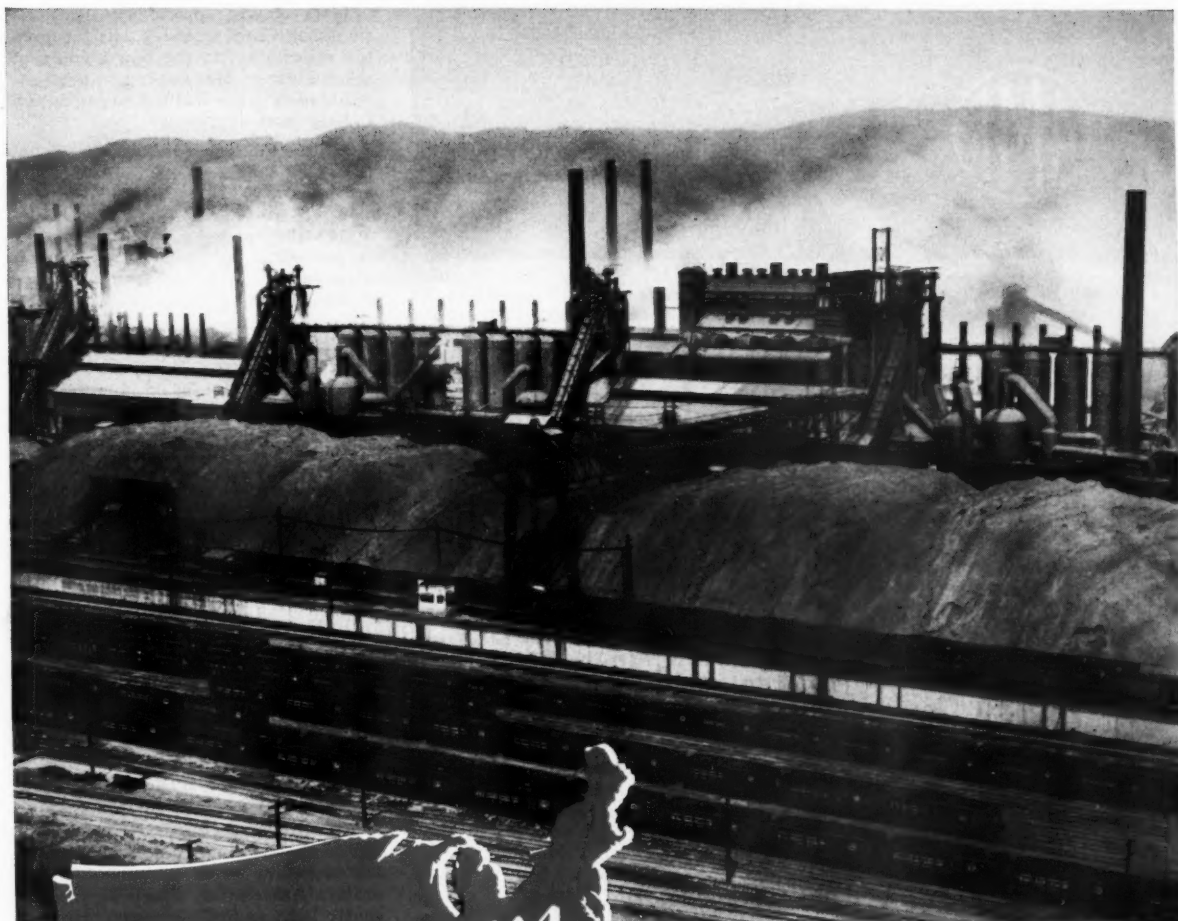
Coal Export Planned

Once again European nations are talking about importing coal from the United States as signs of an impending shortage develop on the other side of the Atlantic. A little less than a year ago, imports of American coal stopped and early this summer the United Nations Economic Commission for Europe declared that European supply and demand were in balance.

The current rearmament program and stockpiling demands have altered the situation and at present Britain's stocks are well below the safety level. To take care of her own needs, Brit-

ain cut exports to Sweden, Denmark and Holland and plans to reduce deliveries to Italy. Accordingly, more and more coal-importing nations have been turning to Germany where boom conditions have developed as steel production has zoomed up to an annual rate of approximately 12,000,000 tons and Ruhr mines are no longer able to fill both home and export demands.

Hence, it may develop that in accord with Britain's plan to buy coal abroad to meet urgent commitments, that U. S. coal will be carried to Newcastle to disprove another old adage.



is indispensable to the power of America

The bituminous coal industry
has the strength—the know-how—
to meet *any* challenge.

Only with indispensable bituminous
can the greatness of America be maintained.

For excellent bituminous coals
to meet your every need,
Ask our man!

BALTIMORE & OHIO RAILROAD

Constantly doing things—better!





Personnel

Arthur V. Wiebel, vice-president in charge of operations of the Tennessee Coal, Iron & Railroad Co., was made president on January 1 upon the retirement of **Robert Gregg**, according to a recent announcement by the company, a U. S. Steel Co. subsidiary. At the same time **John Pugsley**, formerly controller, became executive vice-president, a new position; **J. M. Spearman** was named vice-president in charge of operations, and **Hartwell A. Greene**, controller.

Mr. Wiebel has been with the Tennessee Coal, Iron and Railroad Co. since 1946. Mr. Gregg has been president since 1938.

An Honorary Doctorate in Engineering, the first in its history, has been awarded **Peter F. Loftus** by his alma mater, the University of Ottawa, Canada, from which he was graduated in 1911. He also holds an Honorary LL.D degree conferred in 1939. Mr. Loftus is president of the Peter F. Loftus Corp. and a member of the American Institute of Electrical Engineers, American Mining Congress, Engineers Society of Western Pennsylvania, Cleveland Engineering Society, National Society of Professional Engineers and Pennsylvania Society of Professional Engineers.

Dr. C. Richard Walmer, medical director of the Industrial Hygiene Foundation, has been named managing director of that organization to succeed the late **John F. McMahon**. The announcement was made by **Dr. Edward R. Weidlein**, Director of Mellon Institute, following action taken at a meeting of the Foundation's board of trustees. The Foundation operates under the auspices of Mellon Institute.

Leonard C. Yancey and **Frank Storms** have been appointed vice-presidents of the Iron Mines Co. of Venezuela. Mr. Yancey, formerly vice-president and manager of the Bethlehem Chile Iron Mines Co., will take on the additional duties of manager of

the Venezuelan operations, while Mr. Storms will be in charge of the Caracas office. Mr. Storms was formerly manager of sales for the Ingersoll-Rand Co. for Venezuela and Columbia and has spent the last 25 years in those countries.

Ishmael J. Ratliff, former federal coal mine inspector and president of the Windler Council of the Joseph A. Holmes Safety Association, has been appointed safety and coal inspection engineer for the Bird Coal Co.

E. B. Greene, chairman of the board of The Cleveland-Cliffs Iron Co., announced that there have been some promotions effective December 1 in the iron ore mining department of the company on both the Marquette and Mesabi Ranges.

On the Mesabi Range, **R. M. Belliveau**, who has been district superintendent, was promoted to general superintendent, overseeing operations at both the open pit and underground mines on the Mesabi Range.

Jack F. Chisholm has been promoted to assistant superintendent in charge of metallurgy at the various concentrating plants of the company on the Mesabi Range.

Fred Flink will succeed **E. G. Sterling** who is retiring this month as chief engineer.

Ronald Pearson, formerly district engineer at the company's operations at the west end of the Mesabi Range, will become assistant chief engineer under **Fred Flink**.

On the Marquette Range, **H. Walter Rembold**, formerly drill foreman, assumes the title of assistant superintendent and will have charge of all drilling operations in Michigan.

Joseph H. O'Connor has been appointed traffic manager of Consolidated Coal Co., succeeding the late **E. A. Krueger**.

Appointment of two new officials for Kennecott Copper Corp.'s Nevada mines division at Ruth have been announced by **J. C. Kinnear, Jr.**, general manager. **S. W. Smith** has been advanced to mine superintendent from superintendent, open-pit mine, which position he held since January 1, 1949. **R. C. Nispel** has been appointed assistant superintendent, open-pit mine. He has been with the mining department since 1925.

Irvin Davis, president, Hatfield-Campbell Creek Coal Co., has tendered his resignation to the new owners of the company. Mr. Davis has been associated with the Hatfield organization for the past 40 years.

William H. Brady retired as treasurer of the American Metal Co., Ltd., on January 1, after 56 years of active service. He will continue as consultant to the company. Mr. Brady will be succeeded by **Hans A. Vogelstein**. **Thomas W. Childs** has been elected to succeed Mr. Vogelstein as secretary.

The company has appointed **Hugo de Neufville** director of smelting and refining operations, **Ernest T. Rose** director of raw material supply, and **Jean Vuillequez** director of sales.

Franklin H. Mohney has been appointed executive secretary of the Mineral Producers Association of Kittanning, Pa. He succeeds **R. T. Laing**, who was recently appointed executive director of the Central Pennsylvania Coal Producers Association, Kittanning, Pa.

Dr. H. C. Anderson and **L. J. Reader** have joined the staff of the research laboratory of Foote Mineral Co. Dr. Anderson was formerly research and development director for Hastings & Co. and Mr. Reader was formerly senior inorganic research chemist with General Chemical Co. and Wyandotte Chemical Corp.

B. B. Housman, for 33 years assistant to the secretary, and later assistant secretary of the Pocahontas Operators Association, Bluefield, has recently been named secretary. He fills the vacancy brought about by the retirement of **W. E. E. Koepler**, which became effective December 31, 1950.

Behre, Dolbear & Co., consultants in mining, metallurgy, geology and management, take pleasure in announcing the appointment of **Roland D. Parks**, of Massachusetts Institute of Technology, as associate.

F. Blondel of Paris, France, and **Dr. Tadashi Inouye**, of Tokyo, have been named as foreign consultants.

Louis Eberle, land agent for the last 32 years for the Philadelphia & Reading Coal & Iron Co. has retired. He joined the company in 1895 and advanced through various positions until named land agent in 1918.

Fred C. Hatter succeeds Mr. Eberle and has the title of property engineer.

Dr. Vernon E. Scheid has accepted the deanship of the Mackay School of Mines at the University of Nevada effective February 1. He is a graduate of Johns Hopkins University and University of Idaho. He had taught at the latter school ever since 1934, except for a short period from 1942 to 1946 when he was with the U. S. Geological Survey.

Secretary of the Interior Oscar L. Chapman appointed **Charles W. Connor**, of Charleston, W. Va., as Administrator of the Defense Solid Fuels Administration, which is one of five new defense agencies in the Department of the Interior.



Connor has been serving as a consultant to Secretary Chapman in the formation of the solid fuels defense agency and has had extensive experience in the mining, production and distribution of coal. For several years he was in charge of coal-mining operations for the Armco Steel Corp. at Montcoal, W. Va.

Willis McGerald Peirce, assistant to the general manager of the technical department of the New Jersey Zinc Co., Palmerton, Pa., has been elected president of AIME for 1951, and will take office on February 20 at the Institute's annual meeting in St. Louis. At the same time, the election of **Joseph L. Gillson**, geologist with E. I. du Pont de Nemours & Co., Wilmington, Del., and **Michael L. Haider**, vice-president and general manager, production department, Imperial Oil Ltd., Toronto, Ontario, as vice-presidents and directors of AIME for three years was also announced.

C. H. Burgess, formerly director of the strategic materials division of the ECA, has been elected treasurer of the United Electric Coal Cos.

Retirement of **J. F. Wolff, Sr.**, general mining engineer, Oliver Iron Mining Co., of Duluth was recently announced by R. T. Elstad, president. Also announced was appointment of **Lloyd J. Severson** to succeed Wolff, who will be retained as consultant in engineering. Mr. Wolff retires after more than 43 years with Oliver.

C. E. Leshner, for the past 27 years associated with the Pittsburgh Consolidated Coal Co. and its predecessor, Pittsburgh Coal Co., has announced his retirement as of December 1, 1950.

Graduating from the Colorado School of Mines in 1908, Mr. Leshner began his 40 years of work with the coal industry by joining the U. S. Geological Survey where he originated the present national system of reporting the production, distribution and consumption of coal. During World War I, he was Director of Statistics for the Fuel Administration and later

Economist for the National Coal Assn.

Mr. Leshner came to Pittsburgh in 1924 as assistant to the president of the Pittsburgh Coal Co. As executive vice-president of the company from 1926 to 1938, he supervised the huge modernization program of mining coal and introduced coal cleaning and preparation to the Pittsburgh district.

Mr. Leshner plans to engage in consulting practice as a specialist in coal processing and the economics of production and utilization of coal and its products.

J. Bardswich has recently become general superintendent for the Animas Minerals, Inc., Mancos, Colo.

S. H. Williston, vice-president, Cordero Mining Co. and chairman of AMC's Strategic Metals Committee, has been named Acting Director of the Supply Division of the Defense Minerals Administration.

T. J. Crocker has been appointed manager of Bethlehem Collieries Corp., succeeding the late K. M. Quickel. Mr. Crocker, a graduate of Pennsylvania State College, has served with Bethlehem Collieries in a number of capacities since 1923, and as assistant man-

William Brown Bell, president since 1922 of the American Cyanamid Co., died of a heart attack on December 20 at Marrakesh, French Morocco. Mr. Bell was 71 years old.

K. M. Quickel, manager of Bethlehem Collieries, died on December 4 after several months' illness. Mr. Quickel, a graduate of Pennsylvania State College, worked in coal mines in Tennessee, Kentucky and West Virginia before affiliating with Bethlehem Collieries in 1916. He was appointed assistant to the manager in 1934 and manager in 1940. For the past several years he had been a member of the Advisory Council of the Coal Division of the American Mining Congress.

Robert Albright, 31, sales executive for the Pacific Coast Borax Co., and the son of H. N. Albright, president of the United States Potash Co., died in a hospital in Hollywood, Calif., in late November. Young Albright, a native of Berkeley, Calif., and a grad-



uate of Stanford University in 1941, served in Washington, as an official of the War Production Board during World War II.

Frederick W. Knoke, 58, assistant manager of sales for the American Zinc Sales Co., died on December 25. Mr. Knoke joined the company in 1920 and a few years later became western district manager. In 1930 he was appointed assistant manager of sales, the post he held at the time of his death.

C. S. Bissell, president of Black Diamond Coal Mining Co., Birmingham, Ala., died on December 12.

Charles Henry Woolley, 44, assistant manager of the Proposition Department of The Babcock & Wilcox Co., New York, died suddenly on November 11 in Cranford, N. J.

Julius S. Holl, advertising manager of Link-Belt Co. for almost 40 years, died at the Presbyterian Hospital, Chicago, on October 24, after a prolonged illness.

Mr. Holl was born in Philadelphia in 1886 and entered the employ of Link-Belt Co. at a subsidiary company. The J. M. Dodge Co., Philadelphia, in 1905. He later joined the Link-Belt advertising department and on March 1, 1911, was made advertising manager.

Scott Hershey, who has served as Mr. Aswell's assistant for the past three months, will succeed him as director of information.

James R. Aswell as special consultant to succeed Albert Abrahamson, whose leave of absence from Bowdoin College expires at the end of the year. Mr. Aswell, a native of Nashville, Tenn., is on leave of absence from the firm of Hill and Knowlton. He came with the Resources Board in August of this year as director of information.

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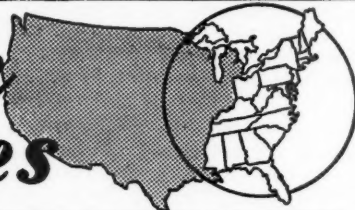
— Obituaries —

NEWS

and VIEWS



Eastern States



Coal Power

At the 19th exposition of power and mechanical engineering, presented under the auspices of the American Society of Mechanical Engineers in Grand Central Palace, N. Y., November 27-December 2, a display by the Baltimore & Ohio Railroad was featured. The unique exhibit emphasized progress in the cleaning and preparation of coal and in the design of coal-burning equipment. Activated diagrams included the Chance and flotation process for cleaning and preparing bituminous coals, and a wide variety of equipment for utilizing quality coal to develop steam-electric power.

In addition to displays featuring coal and coal use, many new materials were shown along with their industrial applications. Ductile iron, made from alloying iron with magnesium, was shown at the exposition for the first time. It combines the process advantages of cast iron with the product advantages of cast steel.

New Jersey Iron Deposits

Studies of commercially valuable iron deposits in northern New Jersey have been completed by the Geological Survey according to Interior Secretary Oscar L. Chapman. The three largest producing iron mines in New Jersey, together with many abandoned mines that formerly yielded a substantial part of the State's production, are within the Dover magnetite district in the northern part of the state. Pro-

duction from the active mines—Mt. Hope, Scrub Oaks and Richard—is now about 500,000 long tons per year. The Mt. Hope mine is reputedly the oldest operating iron mine in the United States, having been active since 1710.

Betty Slope

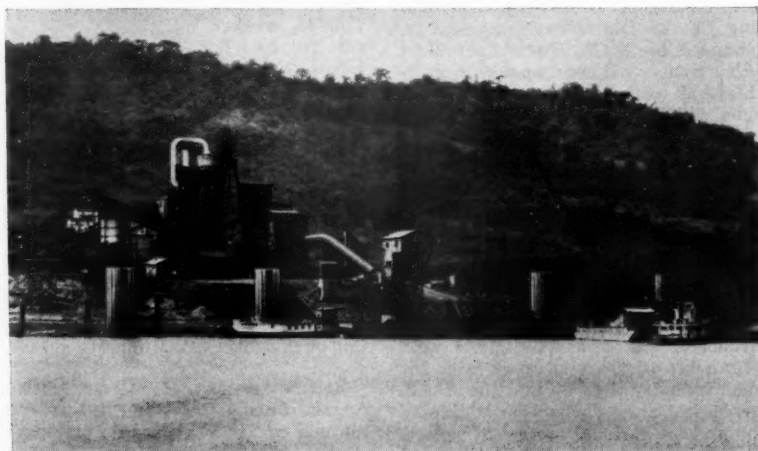
Biggie's Coal Co., Fayette City, Pa., is operating the Betty Slope mine at Wickhaven on the Pittsburgh seam. It is expected that the 24 employees will produce 200 tons per day for the next ten years.

Important Strip Mine Opens

Near Owensboro, Ky., Morris Bros. Co. is operating the Horton strip mine at Horton on the No. 6 seam. The mine has a life expectancy of ten years with a daily production of 500 tons. Modern mechanical equipment is used for stripping the overburden and mining the coal and specification coal is produced in a wide range of sizes.

Pond Creek Pocahontas Co.

Properties of the Southern Coal Corp. in McDowell County, W. Va., were recently acquired by the Pond Creek Pocahontas Co. The property is contiguous to Pond Creek Pocahontas' holdings at Bartley, W. Va. and includes a mine that has been in operation for many years. It is proposed to operate the present cleaning plant at a rate of 25,000 tons a month while installing a new plant with a 50,000-ton monthly capacity. The coal being mined is from the 46-in. Bradshaw seam.



Improved harbor facilities for the Powhatan Mining Co. at its coal-loading tipple on the Ohio River near Powhatan Point, Ohio, include six mooring cells built by the Dravo Corp. Over-all length of the harbor is 700 ft

Anthracite Strip Mine

Wadesville Production Co. of Shendoah, Pa., an affiliate of the Shen-Penn Production Co., is operating the Wadesville strip mine on the Mammoth Seam. The daily production of 2000 tons is prepared and shipped to the Philadelphia & Reading Coal & Iron Co.'s St. Nicholas central breaker.

To Accelerate Stockpiling

Due to international developments a speed-up of the government's stockpiling program is indicated. President Truman therefore asked for an additional \$1.8 billion for this purpose bringing the total of funds available for the stockpiling program to \$2.9 billion in this fiscal year. According to White House spokesman the additional appropriation would go, not only for stockpile purchases, but also to help expand production.

AEC Production Site Named

Late in November, the U. S. Atomic Energy Commission announced that new production plants to be designed, built and operated by the E. I. du Pont de Nemours & Co. will be located in Aiken and Barnwell Counties, S. C. One of the prime purposes of the facility will be for adding to the nation's capacity for producing fuels which some day will be needed to utilize atomic energy for useful power. At present the facility is intended for a military purpose.

Open Mechanized Mine

Utilities Elkhorn Coal Co., Pikeville, Ky., recently announced plans for the early opening of a new completely mechanized 2000 tons per day mine in Pike County, Ky. Development work is scheduled to begin immediately on the 5,000,000 tons Nos. 2 and 3 Elkhorn coal property on Bear Fork of Robinson Creek which has been leased by the company. It will be necessary to truck the coal to Utilities Elkhorn's central cleaning plant at Esco, Ky., for shipment via the C. & O.



Sizes and accessories for your individual requirements. Write for information and sample.

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111 No. 4th Street, Box 35, St. Louis, Mo.

L. C. CAMPBELL, vice-president, Eastern Gas and Fuel Associates, was appointed chairman of the Coal Division by the Board of Directors of the American Mining Congress at their annual meeting in New York on December 5, 1950. As the operating head of one of the world's largest coal producing companies, Mr. Campbell is widely known throughout the industry, and has taken a leading part in promoting efficiency and safety in coal mining. Under his leadership the committees of the Coal Division will continue their studies and their reports on mining practices will maintain the high standards of service that have been established in the past.

Mr. Campbell succeeds S. M. Cassidy, president, Consolidation Coal Co. (Ky.) who has held the chairmanship for the past two years. Mr. Cassidy will continue as a member of the Advisory Council.

Newly appointed members of the Council are: David Ingle, Jr., President, Ingle Coal Co.; K. L. Konnerth, H. C. Frick Coke Co.; James W. Morgan, Pres., Ayrshire Collieries Corp.; Arthur F. Peterson, Vice-Pres., Bethlehem Steel Co.



Coal Grows

The place of coal in our industrial economy was recently highlighted by Bituminous Coal Institute when they pointed out that more than 220 large coal mines each with a daily capacity of more than 500 tons have been opened or placed in development in the last five years. In addition, some 800 smaller mines have been opened, aside from many new surface, or strip, coal operations. These facilities, with a productive capacity of 380,000,000 tons of coal per year, indicate the strength and vigor of one of America's most important basic industries and how it acts to assure the nation of an adequate coal supply for all essential needs.

Water Supply Tunnel Electrified

A 25-mile extension of the Delaware Aqueduct is being bored through the Catskill Mountains to add 300,000,000 gallons of water to New York City's water supply. For the first time in tunnel construction history, tube rectifiers are being used for locomotive power; d-c conversion equipment was required to supply the power for 14 trolley-battery locomotives used to remove the excavated material.

Management Promotions at Island Creek and Pond Creek

In keeping with the continued growth of its properties and the accompanying organization needs, the Island Creek Coal Co. and Pond Creek Pocahontas Co. have made a series of management promotions in the operating department effective December 15.

James L. Hamilton, vice-president

in charge of operations, announced that Charles E. Walker, the present general manager of the Island Creek properties, is being transferred to fill a similar position for Pond Creek Pocahontas Co. This is a new position being created in view of Pond Creek's expanding Kentucky and West Virginia divisions and the consequent need for increased executive direction. Mr. Walker will headquarter at Paintsville, Ky.

Mr. Walker will be replaced at Island Creek as general manager by Hubert H. Barber, presently manager of the Bartley Division of Pond Creek Pocahontas Co. Mr. Barber's present position will be filled by Nicholas T. Camicia, who has been serving as a division superintendent at Island Creek.

Another change at the division manager level calls for the transfer of William F. Diamond, presently manager of Marianna Smokeless Coal Co., a subsidiary of Pond Creek Pocahontas Co., to the Kentucky-Elkhorn division of Pond Creek as manager. Mr. Diamond will replace W. A. Haslam, who recently resigned and will be succeeded by David E. Bayer, currently assistant to manager of the Bartley division of Pond Creek Pocahontas Co.

The above changes caused a number of shifts within the Island Creek organization. Ralph A. Thompson was promoted from superintendent of Mine No. 7 to division superintendent in charge of Mines 1, 22 and 27. M. A. DePietro, Jr., assumes responsibility as division superintendent of Mine 7, 16, 20, 28 and 29. Joseph Skiba continues as division superintendent at the Rockhouse division, which includes Mines 24, 25 and 26.

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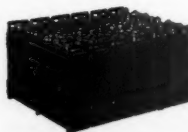
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Iron-Titanium Ore Shipped

Each week a large freighter loaded with iron-titanium ore passes along the St. Lawrence River from the Allard Lake region of Canada to Sorel, 50 miles from Montreal, where the ore will be smelted. These boatloads are the first tangible results of over two years' intensive work on the part of the Quebec Iron and Titanium Corp., a jointly-owned subsidiary of Kennecott Copper Corp. and the New Jersey Zinc Co.

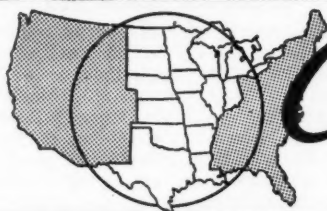
The ore is mined at Lake Tio by open-pit methods for seven or eight months each year because of the severe climatic conditions. Run-of-mine material is hauled over a 27-mile railroad to Havre St. Pierre on the St. Lawrence River. This railroad involved crossing difficult muskeg flats, bridging two rivers, and driving a 700-ft tunnel through a range of hills. Near the loading dock ore is crushed at the rate of 250 tph to minus two-in. size. This temporary plant is handling present ore requirements but will be replaced by a permanent crushing plant, to be erected at the ore deposit, with a capacity of 500 tph.

International Atomic Agreement

According to a recent release from the United States Atomic Energy Commission, the United States, United Kingdom and Union of South Africa have concluded an agreement calling for production of uranium from South African gold-bearing ores. The uranium is to be produced in the Union of South Africa as a by-product of gold production and will be sold to the United States and the United Kingdom under an agreement concluded by these three nations.

South African gold ores represent one of the world's largest sources of the element. Uranium content of the ores is small but potential production is relatively large because of the great quantities of ore mined. Although consideration will be given by the South African government to the construction of additional uranium processing plants at other mine properties the initial production will come from West Rand Consolidated Mines, Ltd., Daggafontein Mines, Ltd., Blyvooruitzicht Gold Mining Co., Ltd., and the Western Reefs Exploration & Development Co., Ltd. If requested by the South Africans, the United States and United Kingdom are prepared to loan funds on a banking basis, to cover the capital cost of the uranium processing plants.

Although uranium will be a valuable by-product of gold production, the revenue and earnings from its production will not be on such a scale as to affect materially the financial positions of the companies concerned.



Central States

C&H Conducts Exploration

In Ontonagon and Keweenaw Counties of Michigan, the Calumet & Hecla Consolidated Copper Co. is conducting exploratory operations. Near Mass City, the Caledonia Adit is being reopened and some 300 tons of rock will be broken to determine the grade of ore available for possible beneficiation by Heavy-Media process.

Trenching is being conducted in the Phoenix area of Keweenaw County in an effort to pick up interesting out-crop.

Ballard Mine Strike Truce

The Ballard Mine about 3 miles southwest of Baxter Springs, Kan., has reopened. The men have gone back to work but the strike has not been settled. The miners refused the company's offer of a wage increase, but decided to go back to work pending further meetings between the company officials and union representatives.

Move Big Draglines

Last July the Northern Illinois Coal Corp. moved two 1300-ton walking draglines across country a distance of 11 miles in the face of a difficult array of obstacles. The move was required because of uneconomic stripping conditions that developed in the Northern Illinois Pit No. 9, where the two walkers had been employed since 1942. When the overburden-coal ratio reached too high a level, mine officials decided to transfer the two units to the Northern Illinois' pit located 11 miles to the south. The 11-mile transfer was made in a period of 16 days and the entire distance was covered with the draglines moving under their own power. At present the two units are in operation at the new pit, working 24 hours a day, seven days a week.

Build Taconite Pilot Plant

The Reserve Mining Co. has announced plans for construction of a pilot plant to produce taconite pellets at its deposits at Babbitt, Minn. The plant will be the first step in a \$160,000,000 mine development program recently announced by the company, which is owned by Republic Steel Corp. and Armco Steel Corp. The new project will cost about \$7,500,000.

This includes construction of the plant, opening a mine and building a new town two miles north of Babbitt. Construction will begin as soon as possible after necessary permits are secured from the state of Minnesota and the federal government for pumping water required in processing the iron-bearing ore from a nearby lake.

Private financing will provide the necessary \$150,000,000 for the development work and plant construction. This will be one of the largest privately financed projects ever undertaken for an industrial enterprise. The project was to be financed with government funds, but when the RFC raised its interest rates to five percent, private banks underbid the government agency on the loan.

New Kansas Strip Mine

To replace its No. 15 mine which is nearing depletion, the Pittsburg & Midway Coal Mining Co. has begun development on its No. 19 strip mine near Hallowell, Kans. To serve the new operation, mining equipment and central cleaning plant equipment near West Mineral and Cherokee County, Kans., will be moved and placed in operation at the new mine. The present schedule calls for beginning production at the new operation in August 1951.

Underwood Coal Co. Fire

A second major fire within a month completely destroyed the shops of the Underwood Coal Co. strip mine at Underwood, N. D. Company officials said the damage was estimated at from \$65,000 to \$70,000. All the mining company's tools, lathes and other shop equipment plus one large caterpillar tractor were destroyed by the blaze.

Tri-State Operators Meet

The mine operators of the Tri-State district met Monday, December 11, at the offices of the Tri-State Zinc and Lead Ore Producers Assn., Picher, Okla., to hear a report from O. W. Bilharz on developments observed on his recent trip to Washington. He reported his findings on the development of legislation for the relief of the present zinc ore situation, which will result in the reopening of the mines to produce low-grade zinc ore.

Water Hampers Zinc Mine

At Shullsburg, Wis., a large flow of water was encountered in Calumet & Hecla Consolidated Copper Co.'s zinc mine and pumps were unable to handle the extra flow of 7000-8000 gpm, which was added to the normal flow of 4500 gpm.

Water was encountered in the cross-cut driving toward the Consler ore body, and it was necessary to use a rowboat for underground transportation.

Steel for New Ore Ships

The National Production Authority in Washington, D. C., has allocated 10,000 tons of steel monthly to build 12 new Great Lakes ore carriers and other cargo vessels. It said the ships would support the planned expansion of steel producing plants. The decision to earmark steel for the Great Lakes ore transport was made to break a threatened bottleneck in the drive to expand steel output by 9,500,000 tons by the end of 1952.

Nine new carriers will be added to the fleet transporting ore. They will haul 7,000,000 more tons of iron ore annually. One additional vessel will be built to haul limestone, also needed in steel production. Two new freight car ferries will be constructed to replace existing ferries which have been condemned.

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Deep Mine Coal Co. Fire

A fire at the Deep Mine Coal Co. New Salem, N. D., caused damages estimated at \$90,000 to surface buildings housing motors, tippie, boiler and other equipment, H. V. Jebb, mine operator, said. There was additional damage to fans, motors, pumps, coal cars and other machinery. Gas interfered with clearing the building. The fire which began in the southeast part of the structure caused such extensive damage that a date for reopening the mine cannot be set.

J&L To Raise Ore Production

Jones & Laughlin Steel Corp. plans to increase ore production by 1,000,000 tons per year. For the first time since 1919, the company is planning to engage in operations once more on the Marquette iron range of Michigan. A subsidiary, Jones & Laughlin Ore Co., will begin work on opening a new underground mine near Negaunee, Mich.

Sucker Flat Tailings

Mike Evans' open-pit mine, Sucker Flat, located in the south end of Webb City, Mo., left large piles of tailings and boulders. These piles have been leased by Mattes Brothers and are be-

ing milled at their Manning mill about four miles east of the city limits of Joplin. They have also been running the mill on custom ore.

The Sucker Flat pile being worked is low-grade ore carrying 1.70 percent zinc and 0.25 percent lead. About one half of the metal content is recovered.

Lake Coal Cargoes Continue High

A report from Duluth, Minn., says that coal cargoes received at the head of the Lakes during the month of September were over the million-ton mark for the fifth consecutive month, bringing total tonnage through September 30 to 5,984,915. During the entire 1949 season only slightly more than 5,000,000 tons of coal were received. R. R. Simonds, acting Duluth district Army engineer, said heavy shipments are necessary this year to replenish the dock supply depleted by last year's abnormal cold.

Waive Freight Charges

The Great Northern, Northern Pacific and Soo Line railroads agreed recently to waive freight charges on all lignite consigned to the U. S. B. M. for use in research at the Lignite Research Lab at Grand Forks, N. D., according to Alex C. Burr, chief of the fuel technology division.

Labrador-Quebec Iron

Financing of the Labrador-Quebec iron ore deposits, in the total amount of \$200,000,000, was announced on November 16 by George M. Humphrey, president of the M. A. Hanna Co. and of the Iron Ore Co. of Canada. It is said to be the largest initial development in a mining venture that has ever been undertaken.

Plans call for beginning immediately the construction of mining, railroad and handling facilities. The start of ore shipments are contemplated in 1955 with production at the rate of 10,000,000 tons a year shortly thereafter. Drilling has developed more tonnage this season and the total drilled in proven ore now exceeds 400,000,000 tons high grade open pit ore with prospects for more.

Work on the 360-mile railroad from the ore deposits to the port of Seven Islands on the St. Lawrence River has been under way for several months by the contracting engineering firms, Stone & Webster, Coverdale & Colpitts, and Sanderson & Porter. In addition to contracts for the construction of the railroad, contracts have also been let on design of the many facilities required to complete the project. These include terminal handling facilities, hydroelectric developments, townsites and power plants.

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Correction

In the article on White Pine Mine by Frank A. Ayer, vice-president, Copper Range Co., in the December issue, the caption under the picture at the top of page 28 should read, "W. E. Romig, general manager of mining properties (second from left) standing between proposed mine portal and mill site."

The president of the Copper Range Co. is Morris F. LaCroix.

On page 30 in column three at the end of the third paragraph, commencing with "Until a year ago..." and ending "...on all the ore" the following sentence was omitted. "For these indicated improvements full credit is given to R. J. B. LaBelle and his metallurgical assistants."

It will be appreciated if readers will please make the above changes in their copies of this article.

New Wage Increases

Employees of the Homestake Mining Co., at Lead, S. D., with the exception of a few surface classifications received general wage increases of eight and ten cents an hour recently, it was announced by Guy N. Bjorge, general manager. Surface wage rates went up eight cents while those of underground workers were increased ten cents. The few surface classifications will receive increases of less than eight cents. Rates for the contract work will be adjusted accordingly.

Arkansas Mercury

In a recently published report of investigations on Arkansas' cinnabar deposits, the Bureau of Mines estimates that mine dumps at mercury properties in three southwestern Arkansas counties contain about 36,000 lb of recoverable mercury. Some 57 mine dumps and other waste piles were examined in determining the salvage possibilities at the mines examined. Measured mine dumps contain 144,400 tons of rock from which about 475 flasks of mercury might be recovered.

Copies of the full report of Investigations 4737 may be obtained from the Bureau's Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa.

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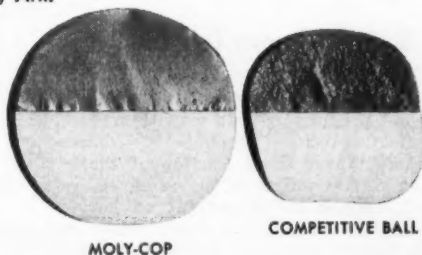
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THERE IS A DIFFERENCE IN FORGED STEEL BALLS

Again, the longer wearing qualities of Sheffield Moly-Cop balls have been demonstrated. This time in a test grinding barite ore at Magnet Cove Barium Corp., Malvern, Ark.

An equal number of Moly-Cop and competitive forged steel balls were charged into the same mill at the same time and were recovered after 4604 operating hours. All were originally 3½ inch nominal diameter and marked for identification.



The recovered test balls are shown in the top photograph. Clearly evident is the difference in rate of wear. The competitive forged balls wore 38% faster, based on average diameter loss. Note also the pronounced difference in retention of spherical shape.

Typical fractures of the two types of test balls are shown in the lower photograph. Note the fine, hard, martensitic grain structure of the Moly-Cop ball.

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Western States

New Year's Eve

Exploration of the New Year's Eve mine, in the Twin Butte mining district of Pima County, Ariz., is being undertaken by the S. W. Shattuck Chemical Co. of Denver, Colo. The property consists of four claims, with ore values in molybdenum and copper. As soon as the shaft is unwatered, underground work will be started. George Scholey, Tucson, Ariz., is in charge.

Monarch Gold Mine

Equipped with a new mill and concentrator, the old Monarch gold mine near Sierra City, Calif., was recently put in production for the first time in many years, with prospects bright for development of additional reserves.

Manager William C. Ennis recently announced a two-year underground development program, including diamond drilling.

Shale Oil Process Cuts Cost

A new continuous process of extracting oil from shale at Rifle, Colo., has cut production costs to within 1¢ a gal of petroleum costs.

Shale is put in at the top of the giant retort and then moves downward against an up-current of hot gases. The oil in vapor form passes with the hot gases to a recovery system.

The new retort is of simple design, low construction and operating costs, adaptable to commercial use and is more efficient than most retorts.

Several oil companies have shown interest and activity in producing oil from the vast shale deposits of Colorado, Wyoming and Utah.

Silver Dollar

The most important new development in the Coeur d'Alene district is at the Silver Dollar mine at Osburn, Idaho, where a crosscut 2166 ft south of the shaft on the 1800-ft level has cut a shear zone 12 ft wide containing nine ft of silver copper ore. The crosscut is being continued. This vein is believed to be an easterly continuation of the Yankee Girl vein from which Sunshine is producing ore in Sunshine Consolidated and Metropolitan prop-

east of Silver Dollar, where it shows the richest ore body in the district. There are several thousand feet of unexplored ground on the strike of the vein between Sunshine and Silver Summit into which Silver Dollar has the only opening. All other discoveries on this vein are on and below the 3000-ft level.

Candelaria Prospects

Newmont Mining Corp. is reported planning diamond-drilling its silver-gold-lead properties in the Candelaria district of Nevada soon after completion of a new 1000-ft tunnel. The bore has been driven more than 800 ft toward virgin ground thought to contain valuable ore bodies. Work is expedited with a mechanical mucker and the project is scheduled for early completion.

Silver Summit Mining Co. is also believed to have this vein

New Rules for Mineral Surveyors

Mineral surveyors are now eligible to make surveys within all states within the region in which they are appointed and also in adjoining states, according to H. Byron Mock, regional director, Bureau of Land Management, in Salt Lake City, Utah. The former practice of restricting a mineral surveyor's activity to a single state slowed action on resources development, he said.

Revisions of the general mining regulations are set forth in a circular, No. 1767, which may be obtained by writing the director, BLM, Washington, D. C.

Polash Mine and Refinery

Officials of the Southwest Potash Corp. announced that plans have been completed for immediate construction of a refinery and mining shaft near Carlsbad, N. M. The addition will raise the area's potash output by 185,000 tons yearly. The \$10 million plant is scheduled to begin operations by the end of 1952.

Announcement that Southwest Potash is moving to Carlsbad was made by the New York office of the American Metal Co., Ltd., parent company of Southwest Potash.

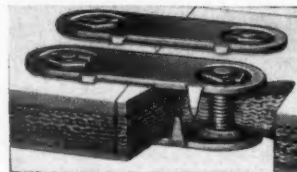


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Mining Association of Montana

The ninth biennial legislative meeting of the Mining Association of Montana, in conjunction with the Last Chance Gulch Mining Association, will be held in Helena on January 11. A one-day business meeting of the associations will be held followed by a complimentary banquet to the members of the Montana legislative assembly.

Oregon Mines Active

The Bohemia mine area of western Oregon near Eugene is booming again but this time lead and other scarce metals are more sought after than gold. A mine and a new flotation mill in the long dormant region employs thirty men producing ore concentrates. A number of other claims are being developed nearby and some placer mines are in operation.

AEC Plans Drilling

The Atomic Energy Commission has announced plans to put eight to ten diamond drill rigs into the Blanding district, about 11 miles southwest of Blanding in San Juan County, Utah, early next year in search for vital ores. Plans are for the Grand Junction, Colo., office of the commission to issue invitations asking contractors to bid on a minimum of 60,000 and a maximum of 110,000 ft of drilling. The program is expected to get under way next February.

Principal objective of drilling will be the Salt Wash member of the Morrison formation. Average depth of holes is expected to be about 140 ft. Preliminary estimates are that eight to ten rigs will be required.

New Pit at Bisbee

Phelps Dodge Corp. will launch a major new copper mining development at Bisbee, Ariz., early in 1951 if negotiations with the federal government are completed satisfactorily. The project will be an open-pit operation on deposits said to be an extension of the Sacramento Hill ore body.

In making the announcement, H. M. Lavender, vice-president and general manager, said: "The corporation has been giving consideration to the development of the low-grade Bisbee east ore body as an open-pit mine and during recent months has undertaken a drilling campaign and related engineering studies.

"The estimated cost of the project would be \$25 million and involves stripping up to 350 ft of overburden, acquisition of drilling equipment, electric shovels and haulage equipment and the installation and equipment of a concentrator.

"While no formal application has

been filed informal negotiations with the government have been initiated. If appropriate arrangements can be made it is hoped that work can be started early in 1951. It is impossible now to make any statement as to when production will be obtained or the rate of production."

The pit location would necessitate rerouting U. S. Highway 80 and the Southern Pacific tracks, and might even cause removal to a new location of part of Bisbee's and Lowell's business districts, since it would lie across the mouth of the canyon just below Lowell.

Grizzly Hill Placers

An extensive drilling program at the Grizzly Hill placers on Spring Creek, 12 miles north of Nevada City, Calif., is reported to have disclosed important gold deposits in a virgin part of the historic You Bet channel, formerly one of California's most prolific placer gold producers, and indications are considered favorable for a concentration of gold values.

Comprising the Dannals, McMurray and Union Gravel Range claims, the Grizzly Hill has been drilled and sampled several months under supervision of Ned Corbett, Nevada City placer operator.

Rock Products Mine Reopens

With higher-grade than usual for New Mexico manganese being discovered at the old closed Rock Products mine, Socorro, N. M., the mine is expected to re-open soon.

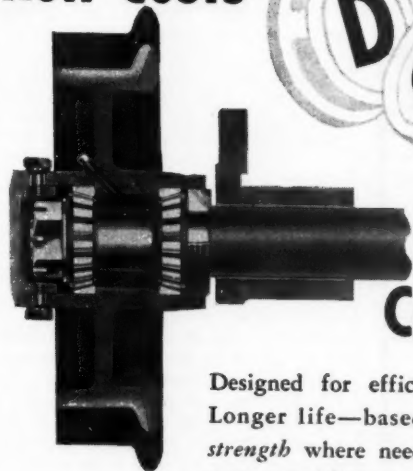
New Pend Oreille Mill

A new mill has been put into operation by the Pend Oreille Mines & Metals Co. at Metaline Falls, Wash. The first of three units has a capacity of 800 tons a day and went into full production at the end of December.

The second unit of the 2500-ton concentrator is scheduled to be brought into operation during the first half of 1951 and a third unit during the second half of the year. The output of the new units, along with the old mill, is expected to be 3000 tons a day. Other facilities completed as part of the project are warehouse, office building, powerhouse, machine shop, crusher house, conveyor systems and concrete ore bins.

According to Jens Jensen, director and secretary-treasurer of the company, achievement of the 3000 tons per day output will depend on maintaining a full complement of skilled miners to keep the mill supplied with ore.

Roll Costs



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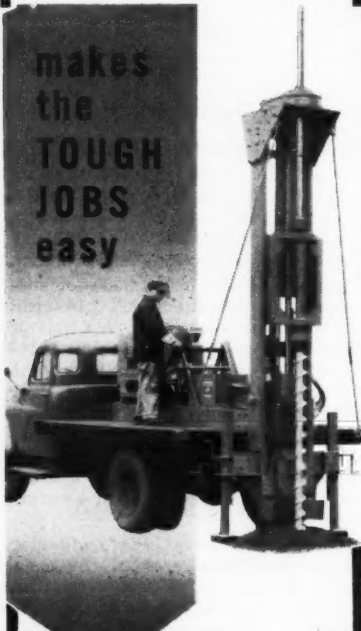
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CFI Coal Mine

A new super-modern coal mine, CFI's part of a modernization and improvement program, will be developed in the Trinidad, Colo., area and will be known as the Allen mine. The property will produce a coking coal. Production is planned for 4000-5000 tons per day.

The haulage slope and escape shaft are in the development stage under separate contracts. The slope will be equipped with an 1800-ft coal conveyor belt and a trackway for hauling men and materials. Seven main entries are planned to work the 4½-5-ft seam of coking coal.

The circular escape-way will be approximately 400 ft deep.

Phosphate Land Bid

The Food Machinery and Chemical Corp. of New York offered the high bid of \$231 an acre for a lease on 60 acres of government-owned land in Bingham county, Idaho. The only other offer was \$57 an acre by J. R. Simplot Co., Boise, Idaho. The offers are in addition to usual rentals at 25c an acre the first year, gradually climbing to 81c. The land is near Shelly, Idaho.

Getchell Production Increased

Getchell Mines, Inc., is reported milling about 900 tons of sulphide gold ore daily at its property near Red House in the Potosi district, out of Winnemucca, Nev. The company milled 153,516 tons with a gross yield of \$689,991 during the first six months of 1950 and is steadily expanding operations. The improved reduction plant is designed for treatment of 1500 tons of ore a day.

Unwater Kay Mine

The Shattuck Denn Mining Corp. has entered into a lease and option on the Kay copper mine, located in the Tip Top mining district about 50 miles north of Phoenix, Ariz. Exploration will be under the direction of H. F. Mills of Prescott, manager of the corporation's Iron King mine. The Kay was extensively developed in the 1920's by a 1200-ft shaft and several miles of drifts and crosscuts, but legal difficulties and the depressed price of copper forced the closing of the mine before it reached a production basis. More recently the mine was partially unwatered and a few test shipments made by the Black Canyon Copper Co., Inc. Shattuck Denn proposes to dewater the 1200-ft shaft and already has a small crew at work installing a hoist and compressor and making necessary shaft repairs. Frank Garrett, formerly of the Iron King, is in charge.

Jumbo Mine Grows

Expansion of mining and milling facilities at the cost of \$500,000 is nearing completion at the Jumbo gold mine in the Awakening district, 45 miles northwest of Winnemucca, Nev. Capacity of the mill is being increased from 500 to 1000 tons of ore daily. More mining machinery has been installed and an extensive underground development program is reported planned.

Located in the Slumbering Hills, the Jumbo is controlled and operated by Austin-Jumbo Mine, Inc. J. A. Kirkman is general superintendent.

Silver King Mill

Silver King Coalition Mines Co. has resumed operation of its 700-ton mill at Park City, Utah. From 100 to 250 tons daily will be milled until the current backlog is absorbed, and then the mill will return to its 150-ton daily schedule. Ore is coming from the recently reopened Silver Hill section, according to James Ivers, vice-president and general manager.

Best Mines Progress

Best Mines Co. is driving a new 2200-ft tunnel at the Brush Creek gold mine, near Goodyears Bar to develop the property to greater depth. Mining is going along steadily in the main workings and ore is trucked to the company's Oxford mill near Downieville, Calif., which has a capacity of 100 tons a day. The tunnel will connect with a deep winze and facilitate exploration and development of ground believed to contain important gold deposits.

Coal-Mine Fires Smothered

After smoldering for twenty-five years two coal mine fires in Wyoming have been brought under control.

The latest fire is located near Bill in Converse County, Wyo., and over the years has burned out an area of about thirty-five acres of coal ranging from 24-90 ft in thickness.

The contract was undertaken by Brasel and Whitehead and Asbell Bros. of Riverton, Wyo., beginning last July and completed about the first of November. The method used was to determine the extent of the fire by drilling test holes and then smothering the fire by moving in and packing approximately 192,000 yards of dirt to cut off the air supply. The total cost of the job was about \$58,000. Coal saved is estimated at 15 million tons.

A fire of similar nature was extinguished in Campbell County. The seam was 90 ft thick over an area of nine acres.

Cornucopia Mine

The Cornucopia mine, above Alder Gulch near Virginia City, Mont., was one of the state's largest gold producers during 1949, according to federal reports released recently. It was one of two gold properties in the state reporting increased production last year. The mine is operated by the Shute Brothers.

Mt. Union Mine Reopens

The Mount Union mine, 10 miles south of Prescott, Ariz., is being readied by the Reorganized Silver King Divide Mining Company of Austin, Nev. The first work will be to open a 600-ft tunnel along the main vein, according to Henry V. Snell, superintendent. Considerable equipment, including a light plant and compressor, has been delivered at the mine for the initial work. The Mount Union, idle since 1906, is credited with previous production of \$125,000 in gold and \$25,000 in silver.

Hercules Comeback Planned

Day Mines, Inc., are staging a come-back for the old Hercules mine at Burke, Idaho, which has been closed for 25 years. The Days have kept the upper workings of the mine in good repair, leaving all the machinery in place and practically ready to run. Recently the lower part of the mine was unwatered down to the 1000-ft level and prospecting started west of a fault which cut off the original ore body. This work developed a new vein system which has produced five good-sized shoots of silver-lead ore. The company has now completed a winze to a point 120-ft below the 1000 level which has shown good ore the entire distance. It is now planned to unwater the mine down to the 1300 level and open the new vein on that horizon. The old Hercules mine has a record of \$21,543,622 paid in dividends.

Lake Tahoe Tungsten Find

An apparently important tungsten field has been discovered on the upper Rubicon River, 11 miles west of Lake Tahoe, Calif. A series of scheelite zones in tactite have been located on Cottonwood and Grayhorse Creeks with one ore body 3 ft wide containing scheelite running 8 percent tungsten. One zone apparently crosses both creeks and extends to Buck Meadow, three miles away.

Rubicon Mining Co. has been formed by San Francisco interests to explore and develop the principal ore bodies. Most of the deposits are on land controlled by Pacific Gas and Electric Co. or owned by Southern Pacific Railroad Co. Many claims have been located in the region and development of several deposits is planned.

Tungsten ore on a property located on the north fork of the Rubicon River, about 32 miles north of Soda Springs, was reported last summer. Engineers examining the deposit reported 4000 tons of scheelite running 2-20 percent tungsten in sight. The property is held under lease by O. R. Swank of Placerville and J. R. Ross of Stockton from Pacific Gas and Electric Co.

Montana Miners Meet

On November 20, Dr. M. E. Volin, chief of the mining section of Region 2, U. S. B. M., spoke at a Missoula, Mont., meeting sponsored by the Montana Miners Association and the Missoula Chamber of Commerce. He stated that the 1950 defense production act for the expansion of supplies of critical materials would be a great help to small mines in Montana and the northwest because capital for opening and operating mines is made available through private and government loans; that the act guarantees long-term procurement contracts where the margin of profit on mines is narrow; that the act encourages the exploration and development of mining; and that the government actively looks for mining possibilities.

Mineral Hill District

The Ajax lead-zinc mine, in the Mineral Hill mining district, is being explored by the Miami Copper Co. of Miami, Ariz. At present, 10 men are employed in shaft repair work and core drilling.

National Gold Mine

Exploration of the National gold mine north of Paradise Valley near Winnemucca, Nev., is being conducted using bulldozers to uncover outcrops. Typical National mine "float" has been found and the operators are searching for the source of the rock.

Lucky Friday Shaft

Lucky Friday Silver-Lead Mining Co., Wallace, Idaho, has completed its shaft development to the 1800-ft level where it has opened an 8-ft vein of silver-lead ore. On the 1600-ft level the company opened three parallel veins. Two of these veins were expected to merge at about the 1800 level but not enough crosscutting has yet been done to prove this. The company is now shipping to the Golconda custom mill 5000 tons of mine run ore for treatment.

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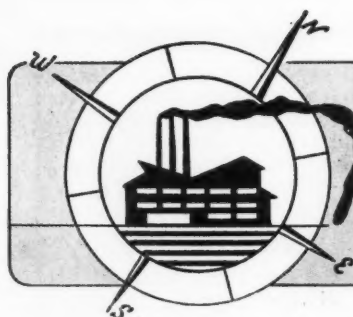
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Manufacturers Forum

1½-Ton, Battery-Powered Trammer for Mine-Haulage Work

A new 1½-ton battery-powered trammer for use in mine-haulage work has been developed by the locomotive and car equipment divisions of the General Electric Co. Small and compact, the trammer is designed for use in metal mines where clearances are restricted.

Available in any track gage between 18 and 24 inches, the new unit is 71½ in. long over bumpers, 35½ in. wide and weighs 3000 lb with its battery. With a standard battery, the trammer



is 38½ in. high; with a high type battery, 44½ in. high. Individual drive from the motor to each of two axles provides maximum tractive effort.

Rated drawbar pull of the trammer is 400 lb, but a maximum drawbar pull on level tangent track of 750 lb is available. Maximum speed of the locomotive alone is seven mph. Its speed at rated drawbar pull is three mph. Tractive effort is furnished by a totally-enclosed four-pole dc motor designed especially for battery-powered operation.

The gearing is double reduction comprising a spiral bevel and spur gear, producing a total gear ratio of 13.35:1. Anti-friction bearings are used throughout the entire drive unit.

A master controller, with one handle, governs both power application and braking operations. In acceleration, the controller provides

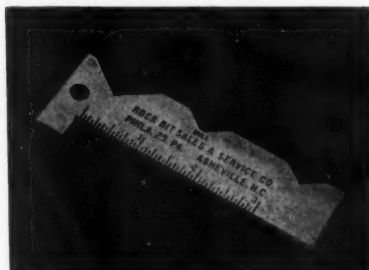
three resistance steps and one step without resistance. The controller permits a limited amount of mechanical braking against the first two resistance steps to aid the operator in starting against a grade, or on slippery tracks.

Any standard make of storage battery may be used for power supply. A standard battery box is arranged so it can be lifted off or rolled off for battery transfer. The battery compartment is easily adapted to a high capacity battery.

The locomotive has a folding cab which permits loading in mine hoist cages. The frame is of rigid, all-welded construction from rolled carbon steel plates. A turret-mounted sealed-beam headlight and a foot-operated warning gong are supplied with the trammer.

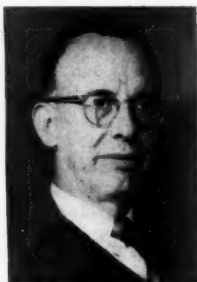
Bit Gauge

Rock Bit Sales & Service Co., 2514 East Cumberland St., Philadelphia 25,



is offering a gauge for use in reconditioning tungsten-carbide bits. The gauge indicates when to regrind and gives the proper angle for sharpening a dull bit.

Goodman Announces Personnel Changes



M. F. Cunningham



W. T. Ferguson



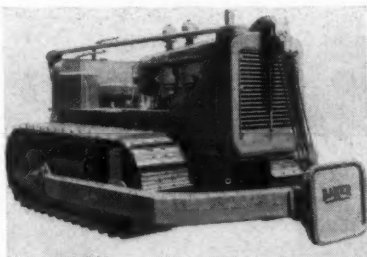
C. E. McWhorter

THE Goodman Manufacturing Co., Chicago, announces the following changes in sales administration personnel: Morris F. Cunningham, formerly vice-president and sales manager, has been elected vice-president in charge of sales succeeding the late A. C. Green; William T. Ferguson, former assistant sales manager, has become sales manager; Cedric E. McWhorter, formerly district manager at Denver, has been named mining engineer. Headquarters for all three will be the company's main office in Chicago. K. E. Caine will be assistant mining engineer in the Pittsburgh district.

Also announced are the appointments of L. W. Hall as new district manager at Denver, W. H. Carson as assistant district manager at Huntington, W. Va., and L. W. Peterson as manager of a branch sales office and supply depot in Birmingham, Ala. This office will serve the states of Alabama and Western Tennessee and replaces Goodman representation by the General Machinery Co. of Birmingham. Other changes include the appointment of Mike Reid as sales engineer with headquarters in Bluefield, W. Va., and the transfer of sales engineer George Rupp from Middlesboro, Ky., to Beckley, W. Va.

Tractor Pusher

A new pusher for use with the Allis-Chalmers HD-19 Tractor has been announced by the Baker Mfg. Co., Springfield, Ill. Available as a complete unit or as an attachment,



the new Baker pusher weighs approximately 725 lb complete, is heavily reinforced, sturdily constructed and designed to work with practically all types of scraper push plates.

Operating personnel, it is said, will find the performance of the new pusher especially helpful since it floats with the pusher block of the scraper, whether it be high on a fill or low in a deep cut.

Further information is available from Baker-Allis-Chalmers dealers or direct from Baker.

Wemco Mobil-Mills to Australia and Austria

A new coal preparation plant, treating 330 long tons per hour, will go into operation at the Commonwealth mine of the N. S. W. Mining Company in Australia in 1951. The firm recently placed an order with Western Machinery Co., San Francisco, to design and furnish the new plant which will include a No. 5C Wemco Mobil-Mill using a 14-ft diam Wemco Cone

Separator as the heavy media separatory vessel.

Also included in the new installation is a heavy media feed preparation plant consisting of washing screens and a 54-in. diam Wemco Coal Spiral, a water reclamation system incorporating a 55-ft diam Wemco Thickener, and a Wemco Media Grinding Plant used for the preparation of magnetite medium and consisting of a 3-ft Wemco Ball Mill, 18-in. Wemco SH Classifier, Demagnetizing Coil, Feeder, Bin and other components. All units are prefabricated and designed for rapid field assembly at the plant site.

The Austrian-American Magnesite Co. at Radenthein, Austria, has also placed an order with Western Machinery Co. for a prefabricated heavy media separation plant. Incorporating a 14-ft diam Wemco Cone Separator as the separatory vessel, the new plant will treat 40 metric tons per hour of 1 in. by 10 mesh magnesite ores. Shipment already has been made from Wemco factories and installation and operation of the new plant will begin as soon as possible.

ACF Employees Honored

A plant-wide ceremony honoring the employees of the American Car & Foundry Co. at Berwick, Pa., for establishing an all-time state record of more than 3,000,000 man-hours worked without a lost-time accident was held December 14. Pennsylvania's Governor James H. Duff presented the Award of Honor to C. J. Hardy, Jr., president of ACF, at ceremonies on the plant grounds. The award was in the form of a special citation from the Pennsylvania Department of Labor. Following the presentation an informal dinner was held at the plant dining room honoring the supervisory force that made the safety record possible.

— Announcements —

Manhattan Rubber Division, Raybestos-Manhattan, Inc., recently announced the appointment of John T. M. Frey as assistant manager of the New York branch and Lamar S. Hilton as assistant sales manager of the abrasive wheel department.

President Louis B. Neumiller of Caterpillar Tractor Co. announced the appointment of Harmon S. Eberhard, executive vice-president; William Blackie, who will coordinate with Peoria the administration of the Joliet and San Leandro plants and Caterpillar Tractor Co., Ltd., a new British subsidiary; E. W. Jackson, vice-president; Ralph M. Monk, vice-president; W. H. Franklin, administrative director of the accounting and the traffic and order departments; and A. N. Whitlock, who will assume direct supervision of accounting.

William F. Williams has been appointed vice-president in charge of manganese sales for Taylor-Wharton Iron & Steel Co.

W. F. Garlow, former advertising manager of the Hewitt Rubber Division and the Hewitt Restfoam Division, Hewitt-Robins, Inc., has been appointed sales promotion manager of Howe Scale Co., Rutland, Vt.

J. S. Johnson has been appointed assistant to the president of United States Rubber Co. He succeeds G. R. McNear, who has been elected a director and the managing director of the North British Rubber Co. Ltd., Edinburgh, Scotland, in which U. S. Rubber is a substantial stockholder.

Mr. Johnson, a native of Middleboro, Mass., has been with U. S. Rubber since 1931.

CATALOGS AND BULLETINS

BARREL TILTER. *General Scientific Equipment Co., 2700 W. Huntingdon St., Philadelphia 32.* Complete information regarding the new GS safety tilter which provides a fast and convenient method of draining acids and other liquids from stainless steel barrels.

FILING SYSTEM. *Remington Rand Inc., 315 Fourth Ave., New York 10.* Creating the contents of an average five-drawer file costs over \$4500 and operating this file one year costs approximately \$202. A booklet entitled "A Yardstick of Filing Cost and Efficiency" presents costs relating to the creation and operation of files. The handbook has a complete bibliography and draws pertinent material from authoritative sources in the field. The booklet with an accompanying self evaluating questionnaire can be obtained by writing to the company.

FLEXIBLE CORDS AND PORTABLE CABLES. *The Hazard Insulated Wire Works, Division of the Okonite Co., Wilkes-Barre, Pa.,* has a bulletin H-420, a manual on flexible cords and portable cables, available. In the 55 pages of this "Hazacord" booklet are given applications of different types of the chief electrical conductors. Among the applications are use of different types for shot-firing cords, for power supplies to walking draglines and shovels and other uses in mine and shop. A series of tables gives dimensions, current carrying capacities, formulas for determining amperes, horse power, kilowatts and other information pertinent to users of flexible electric cords and portable cables.

PIPE AND FITTINGS. *Naylor Pipe Co., 1230 East 92nd St., Chicago 19.* Naylor Pipe Co. Bulletin No. 507 describes Naylor lockseam spiralweld steel pipe, fittings, couplings, and accessories. Major physical properties of pipe and fittings, including an important table on collapse pressure, are detailed in this bulletin which contains all the essential information needed for quick reference. Copies of the bulletin will be sent on request.

PIT AND QUARRY POWER. *International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill.,* has a new folder available entitled "High Production, Low Costs . . . With International Pit and Quarry Power." This six-page pamphlet contains pictures and statements from various quarries that use International Power units. There is also a work capacity chart covering all of the carbureted and Diesel power units manufactured by International Harvester.

A copy of this colorful folder, form A-317-NN, can be obtained by writing to the company.

UNIVERSAL JOINTS. *Curtis Universal Joint Co. Inc., Springfield 7, Mass.,* has just released its catalog C1. This catalog contains data on how to select Universal joints, graphs illustrating the results of static torque tests, angle of operation efficiency curves, and frictional heat loss curves. It also gives assembly and disassembly instructions, engineering data, weights, specifications, dimensions and complete buying and ordering instructions. To obtain a copy direct your request to the above address.

WALKIE TALKIE. *Doolittle Radio, Inc., 7421 S. Loomis Blvd., Chicago 36, Ill.* The little portable FM Radio-telephone is described as having increased power and range to facilitate two-way communication in many fields of operation. It is a complete portable two-way radio station ready for instant voice communication.

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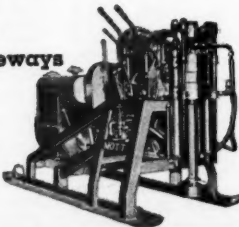
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